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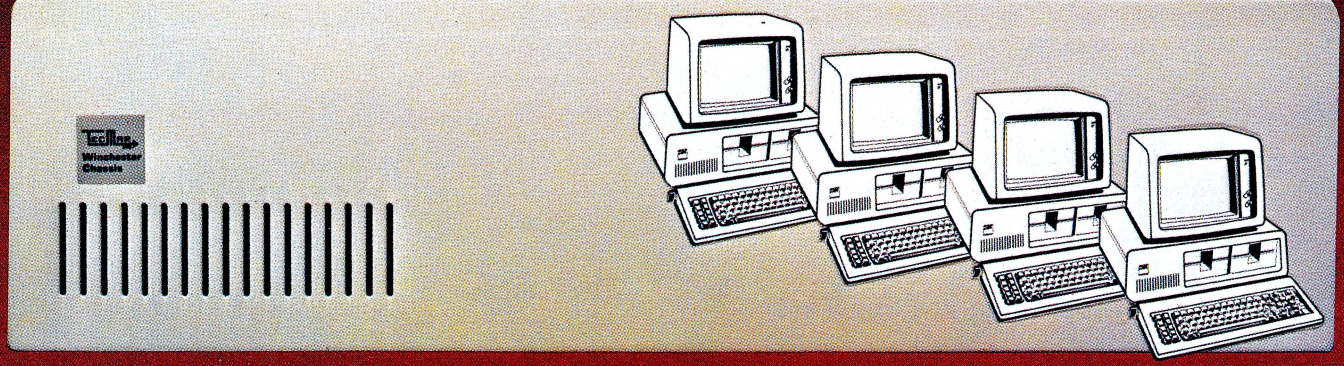

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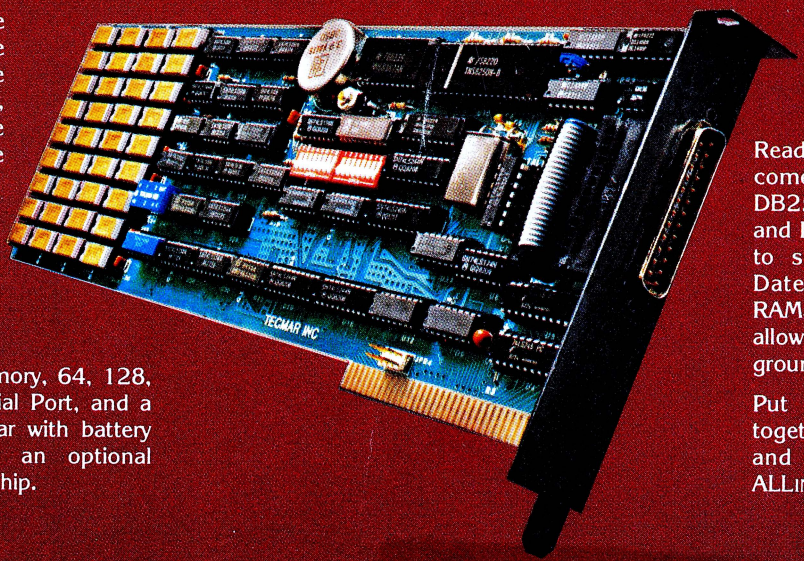

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crosstalk

Vanishing Point

In April of 1982, we purchased an IBM pc along with an IBM Cobol software program. We needed the IBM Cobol software program because our programmer is trained in this language. We had planned a custom program essential to our business and chose IBM because of their experience. We felt their products would be tested properly before marketing. In addition, they would give our company backup help if an unexpected problem arose.

Upon receiving our IBM and Cobol program, we discovered the program had mistakes. In addition, it would not do some functions properly. We contacted our dealer and IBM. IBM told the dealer that the problem we diagnosed was apparent. Consequently, IBM said they would have the problem corrected in a week or two. Another month went by and we phoned our dealer. He said that IBM had stopped sales on the Cobol program until it was fixed; however, they did not give him any date on when the error would be corrected.

We have owned our pc four months, and we are unable to do anything with the program. It has been a very costly experience to us and probably to everyone else in our same position. However, all IBM and Microsoft have to say or do is *nothing* except "We will get it corrected *someday*." I think your readers and any potential buyers of the IBM pc should know about this unfortunate, costly experience. I would like to close with this note: A big name does not mean the best product and service.

Jerry C. Wilcox, Oklahoma City, OK

Uneasy Writer

The August issue was very interesting and I especially liked the two robot articles. I am a physicist/engineer with over thirty-five years in analog/digital logic. I have had almost too much experience in hardware and now I'm learning all that I can about software.

While I have a lot of other applications and uses for the IBM pc, I use it first as a word processor. Writing does not come easy to technical people and I'm no exception. I have, however, written several technical articles and coauthored a book. But I've always hated the typewriter even though I prefer to use one because the text looks so much better. Typing errors always put a caboose on my train of thought. So I end up using pints of white erase paint or whatever it's called. The worst part of all is proofreading. I always find misspelled words or errors in text arrangement. So in recent years my writing has nearly stopped. I even hate to write letters to my friends and relatives because I have to type them (nobody can read my handwriting). Now I can hardly wait for the IBM pc version of *SpellStar*. I had difficulty in learning to use *WordStar* because the instructions were more documentation than instructions. I'm sure that if I had some personal basic instruction I would have done better. Even though I am a long way from being proficient with it, I can appreciate its merits.

So I hope that *Softalk* will be written more for nonprogrammers than programmers. I don't know all of the buzz words that software people use, so it will take me a little while to become proficient. I think that the IBM pc will bring a lot of professional people into the market like myself who need the many advantages that computers have but who have postponed buying a system until now.

Harry Morgan, Chatsworth, CA

Loud

I found the July issue particularly interesting, especially the System Notebook column by Alan Boyd wherein he gives the clearest explanation of IBM's DOS that I have read so far. It is better by far than the manual that came with my pc. If the level of future articles is as high, you may be sure that I shall be a faithful subscriber.

Francis Caro, Little Falls, NJ

And Clear

I just got issue number three and all I can say is: whatever you're paying Alan Boyd, it's not enough! Keep those articles coming!

Jan Isley, Marietta, GA

Baker's Choice

As a new owner of the IBM pc, I've found that its documentation has made setup and system operation a piece of cake. *Softalk IBM* is the icing.

F. T. Switzer, Fort Wayne, IN

Strategy Derailed

I would like to make a few comments regarding your August review of my stock market simulation game, *Millionaire*. The author of the review obviously did not understand the primary focus of the *Millionaire* program.

Millionaire is a unique approach to stock market learning—not old stuff as the author indicates. The program allows someone with no knowledge of the stock market to develop a conceptual understanding of the market in a few hours while playing an enjoy-

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able game. To the sophisticated stock market investor, the game offers a challenging array of actual stock market trends and situations. We have had only praise about *Millionaire* from both novice investors and brokers.

Many of the reviewer's comments just don't make sense. *Millionaire* is about stock market speculation. Why does the reviewer criticize the fact that we don't include long-term gains and dividends? These are not important factors to the speculator!

The reviewer feels the game is simplified because it has only five industry groups and fifteen stocks. How many people own more than that? The reviewer is also concerned that you can't buy Apple or solar energy stock but you can buy IBM stock. Who cares! This is a ridiculous criticism.

The reviewer didn't like Blue Chip stocks plummeting to penny stock levels (a gross exaggeration). This occurs because *Millionaire* creates a new stock market environment after each ninety-one-week session. IBM may be a real winner in one session and a bummer in the next. I consider this feature one of *Millionaire*'s strong points. You *don't* see the same old graphs time after time.

The game was designed to strike a balance between entertainment, the novice player, and the sophisticated investor. Obviously, in order to achieve this result, tradeoffs were made. Things such as interest on money in the bank and stock splits added nothing to the enjoyment and little to the learning experience, so I did not include them in the game. It is hard to understand your reviewer's criticism of these omissions when *Millionaire* is being used as a training vehicle in investment seminars.

I think *Millionaire* is one of the most enjoyable financial learning experiences one is likely to encounter. With margin accounts, call and put options, daily news reports, industry trends, and a dozen other features, *Millionaire* should offer something for everyone.

James S. Zuber, Woodland Hills, CA

Thrilled Again

Last month I bought the second issue of *Softalk for the IBM pc*, and was thrilled to find that my decision to buy an IBM rather than an Apple would not cost me the usefulness of your magazine (which, along with *Nibble*, has taught me most of what I know). I am looking forward to your gracing my mailbox monthly.

Ryan Gale, San Diego, CA

Bound To Please

Your Beginners' Corner gets to the complete beginner's level in clear and understandable language. Good job . . . should be expanded and published in book form.

John S. Robinson, Dallas, TX

Heaven Sent

I purchased your first issue at a software distributor in Savannah, Georgia, and thoroughly enjoyed it from cover to cover. It was a minor miracle that I could even find it, as the nearest IBM product center is in Orlando, Florida. (I purchased the pc by mail from them.)

I have not as yet purchased a printer and would appreciate future articles which include user comparisons.

Len Pigat, Hilton Head, SC

Informing the Ranks

I am quite impressed by the content and layout of your magazine. I feel that you have filled a niche which was, until now, vacant by supplying the public with your reviews, interviews, and informative columns. I'm not a rank amateur with computers but I still see the need to have a beginner's column that will reduce frustrations and encourage new users to keep up the learning process in spite of the bad documentation that sometimes accompanies exceptional hardware.

In short, I find your magazine to be an excellent and informative publication. Keep up the good work.

Erik Klein, Commack, NY

Routine Business

I have a plea for help and a possible contribution. I have tried to use Terminal.bas to upload data in hex to an IBM 370 to no avail. Download doesn't work either. The files are accessed (downloaded) or opened (uploaded) on the 370 but no data transfer occurs and the program hangs.

The possible contribution is a routine to convert hex to integer since there is no function in Basic to do this conversion. Hex$ converts integers to hex but the reciprocal function is missing. The routine a colleague and I hit upon is as follows:

```
10 REM specify number of variables
   per line of data
20 FOR N =1 TO 7
30 REM concatenate &H with hex
   value
40 M$(N)="&H"+T$(N)
50 REM extract the numerical value of
   M$(N)
60 T(N)=VAL(M$(N))
70 NEXT
```

The length of the hex string specified in line 40 would have to match that called from a file. I am not a skilled programmer so the *rem* statements may not be completely clear but the basics of the Basic routine are there. We use the routine to convert hex read to disk from a tape cassette loaded by a weather data logger because we haven't been successful in uploading data to the IBM 370.

Duane Bartholomew, Honolulu, HI ▲

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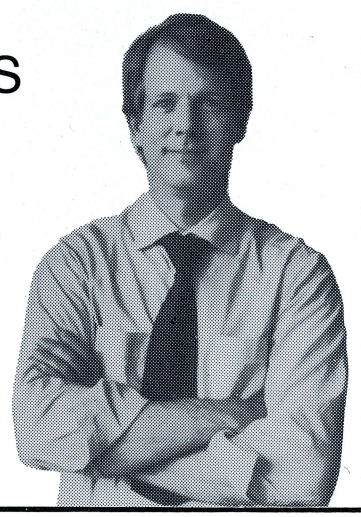

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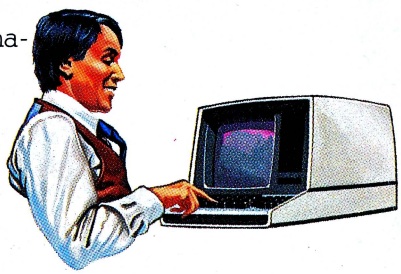

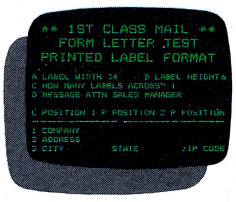

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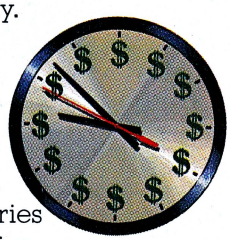

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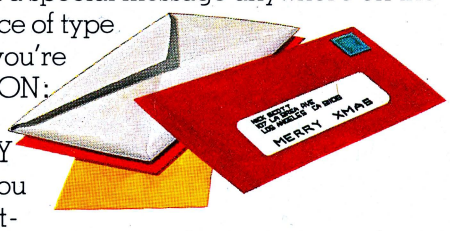

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Exec Infocom:

by Roe R. Adams III

The Infocom party. Back row, left to right: Chris Reeve, J. C. R. Licklider, Gabrielle Accord, president Joel Berez, Scott Cutler, and newest addition, author/programmer Michael Berlyn; front row, Zork authors Dave Lebling and Marc Blank, Stan Meretzky.

Nestled in a cozy office complex in Cambridge, Massachusetts, due west of Harvard and the Massachusetts Institute of Technology, is the new corporate headquarters of the legendary Underground Empire, Infocom. Perhaps embassy is a more accurate description of the facility, as there is certainly the feeling of stepping onto foreign, even alien, soil. Impressions of Infocom's several stories overlay and intertwine with the threads being woven on the loom of reality. Approaching the entrance, we recall the promise of a special surprise at the end of our visit, and that, in true *Deadline* tradition, if we keep our eyes open, we might discern clues as to what that surprise is. Come along and see if you can anticipate the answer with us.

Upon entering, we find a strangely familiar lamp sitting on the receptionist's desk. Alongside is an attractive paperweight: a sword embedded in a crystal rock. A man resembling a prospector sits waiting in the lobby. The sword glows brightly blue for a moment as we enter the offices. Traveling through a series of winding, twisting passages, we arrive at the Wizard's Den. There is the Wizard of Frobozz himself, bent over, gazing intently into a black sphere.

Marc Blank looks up from the computer and smiles.

Before the Fall. To understand Infocom is to return to the pre-pc days of the early seventies at MIT. As Joel Berez, president of Infocom, relates:

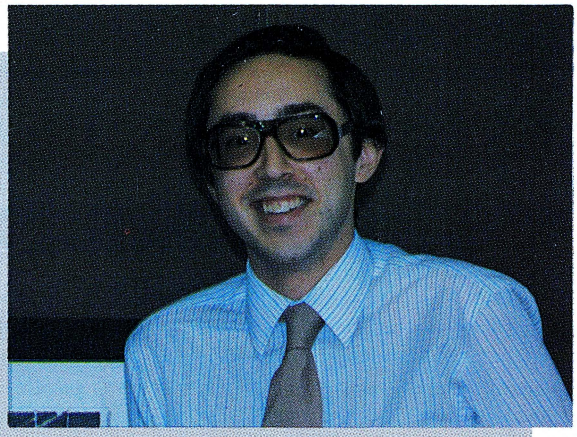
"We all at one time or another had worked for a research group that's now part of the Laboratory for Computer Science at MIT. This group was strongly result oriented. It was called the Dynamic Modeling System; now it's the Programming Technology Division.

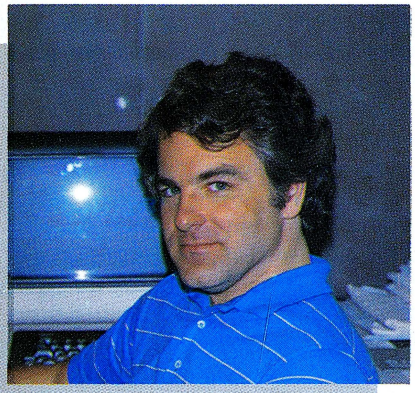
"We believed it was important to develop programming tools before trying to develop applications. Over the years we had assembled an extremely advanced set of tools. Marc Blank lived next door to me when we were undergraduates and we both worked in this group.

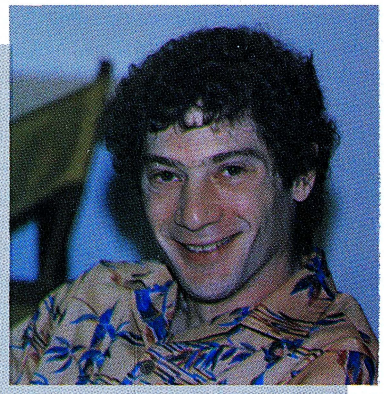
"A dream of the leader of the group, Al Vezza, was that someday he would bring together all the people who'd been involved with the group to start a commercial venture using the same techniques that had been so highly successful. Of the ten founders of Infocom, eight came from the group.

"We also have three generations of teacher/students here; Dr. Licklider, in a sense, was Al's teacher, and Al was ours."

Joel Berez sets down the translator, as Marc Blank materializes to introduce us to one of the cocreators of *Zork*, the Great Implementor himself, Dave Lebling.







Fantasy for Sale

The leaders. Top row, left to right: chairman Al Vezza and Joel Berez; bottom row, Dave Lebling, Marc Blank, and Mike Berlyn.

Moving through a door to the west brings us into a large conference room, where we sit around a shimmering table; everyone avoids touching the table. Water seems to glisten in an African painting on the wall where crocodiles and hippos swim serenely. We notice, though, that the green bubble on the dam upstream is not flashing. The robot in the corner puts down its apple and, while whistling, serves tea. Strange, our cups have a slight discoloration in the bottom.

The Underground Empire existed long before Infocom's founding, so Lebling and Blank relate how they first opened the door to *Zork*; the background music plays an oldie by the Taylor Mills Road group.

As Lebling explains it, "We had so much fun playing *Adventure* that when it was all over, we said, 'Oh dear, there are no more of these; how awful!' "

Blank, officially vice president in charge of product development, adds that there were some areas where they thought they could improve upon the original *Adventure*, which had been written in Fortran.

"It really bothered us that if you said, 'Take bird,' it would put the bird in the cage for you—sort of doing things behind your back. I suppose it's the nature of computer programmers everywhere to want to outdo the other person, to be a little better, especially in games.

"There were primarily three of us who worked on the original *Zork*: Tim Anderson, Dave, and I. In 1976, Tim and I started with an eight-room dungeon on a PDP-10 written in Muddle, or MDL, which was developed at MIT in the early seventies as a spinoff of Lisp.

"Then we began thinking of problems to overcome for the adventurer. The silliest thing in *Adventure* was that you always had to say, 'Take ax, throw ax; take ax, throw ax.' So we decided that anything you threw at *Zork*'s troll, it would eat! A lot of things in *Zork* pay homage to *Adventure*."

Lebling and Anderson's Inferno. "We were thinking all along about an underground world. Tim and I had each read a lot of fantasy and it struck us as picturesque. We liked the idea that this was going to be like a book, like a story, so the player can say, 'I can see this world.' So we spent a lot of time on developing descriptions and trying to make the world seem more realistic."

That's where Lebling comes in. "I'm in charge of the purple prose; and I did the geographical design of *Zork I*."

Blank explains how *Zork* came to be *Zork*: "We'd generated this game with eighty places and five problems, and we didn't have a name for it. We just put it on the system. We had to have some type of name for it—files need names. *Zork* was a nonsense word around the lab at the time as an exclamation—like 'Zork, look at that!' The name stuck.

"We then added direct and indirect objects so we could tell it things like 'Kill troll with knife.' The parser got more and more sophisticated. As things progressed, we understood prepositions, used adjectives, and differentiated between objects with adjectives."

By June 1977, the first version of the mainframe *Zork* was finished. Blank had done the bulk of the work with help from Dave, Tim, and Bruce Daniels. Daniels is now working for Apple. He had done the coal mine section in *Zork I* and helped on the puzzle in *Zork III*. During 1977 and 1978, the areas of *Zork II* and part of *Zork III* were added. That is as far as *Zork* was developed on the mainframes.

How had Blank found time in his hectic, pressure-filled schedule at MIT to do all this massive work on *Zork*? Says Blank, "Oh, no. I had graduated from MIT in 1975 with a degree in biology. At the time of *Zork*'s development, I was in medical school at Albert Einstein in the Bronx in New York City." Ah. That explains it. "I graduated from there in 1979. So how did I write *Zork*, in Boston, from New York? Easy. I used to drive up every weekend and work with Tim on it. During the week I would think of ideas to try out. I like biology and was sort of interested in medicine, but I love playing with computers, and I love games and programming." Enter Infocom, stage right.

On Goldfish Pond. Al Vezza is the Prime Mover of Infocom and chairman of the board. He still works at MIT full time, where he holds the impressive title of senior scientist and is currently acting associate director of the lab. Gazing out a rear window at the aspen trees and the goldfish pond, Vezza recalls, "Our main objective when we started this company in 1979 was to use our technology to sell products. At that time, we didn't have a specific product in mind, but my firm belief is that the way you create new products, with new ideas, is to get a bunch of bright people, put them in an environment that is stimulating, and let them go at it."

Over the summer of 1979, Berez told Blank about Vezza's exciting new venture. Blank suggested that *Zork* was certainly marketable, and, according to Joel, "Marc and I kicked around the idea of putting *Zork* out commercially; we put together the fundamental concepts that summer." Berez, at that time, was in the Sloane Management School at MIT earning his business degree. They took the idea to Vezza, who agreed to let *Zork* be Infocom's first venture.

From the summer of 1979 to the spring of 1980, Blank wrote the compiler and Lebling wrote the assembler for the new language. Bruce Daniels wrote the Apple Kernel. During this time, *Zork* for the micro was being developed independent of MIT on rented space on a DEC-20 from Digital Equipment.

In the spring of 1980, the decision to license *Zork* to Personal Software was made. Vezza relates why it was not a hard sale.

"We talked to Dan Fylstra from Personal Software about *Zork*. Turned out that when Dan had been in business school in Boston, he played *Zork* on my computer while doing a thesis. So he knew what *Zork* was all about."

The Wizard and the Shape Changers. *Zork* did quite well under Personal's umbrella, but in the fall of 1981, Personal underwent a corporate metamorphosis into VisiCorp. The new image involved VisiCorp's dropping all its game lines and concentrating on business programs, so Infocom took back the rights to market the *Zork* line. This created quite a problem for Infocom at first.

During a moment's pause in Blank's narration, we watch a crystal phoenix being reborn in the air above the shimmering table. Blank continues the story.

"We've been in business three and a half years, but only one year has involved marketing under our own name. Last fall we started an incredible scramble. We had *Zork II* ready, but we didn't know anything about packaging or advertising. So we got a terrific agency, Giardini/Russell in Watertown, Massachusetts. In two days they came up with the *Zork* logo and the manuals—really quick; and we had *Zork II* out for Christmas. We took our first office last September in the Faneuil Hall Marketplace in Boston. It was only one room and, in true *Zork* fashion, required a special key for unlocking the elevator to get up to that floor. Joel was the first full-time employee and started last July. I came on at the same time and became full time in January. We now have a staff of four people and we'll be expanding to ten within four months. Others, like Dave, have regular jobs elsewhere, working here evenings and weekends. We moved into these new offices in January."

As Blank shows us around the offices, we notice all of Infocom's package fronts framed on a wall, including the two new ones, *Zork III* and *Starcross*. Next to *Starcross* is an empty frame filled with ivy. Perhaps the ad agency is from nearby Harvard.

Great Caesar's Muddle. As we walk, Blank and Berez explain the Muddle language and why it's so central to Infocom's success.

"Muddle, like us, is a result-oriented, function application language," says Berez. "A program is formatted, debugged, and compiled on a DEC-20 in Muddle, then translated into machine language, which is interpreted on the IBM pc. Thus the program is easily transportable between different machines. Currently, all our programs are available for eight machines, including the Apple and the new NEC."

Blank adds, "What we've done is design a machine independent language, which is emulated like Pascal on all the different machines, and optimized it for doing what we do. It's very compact. For example, on the mainframe, *Zork I* was about six hundred thousand bytes. That same game in its entirety is seventy-five thousand bytes on micros. So we get a factor of eight compression."

Berez then points out, as we step aside for the bear, that "this gives us a tremendous marketing edge. If you can show us any machine that will sell a reasonable number of copies, we'll adapt our games to run on it."

The Infocom parser is also a unique and somewhat mystifying tool. Blank defines a parser as "a module of a program that takes English input and distills it into smaller pieces of information. The parser has three outputs. It understands a verb, a direct object, and an indirect object. If I say, 'Put the brown bag into that trophy case' " (pointing to the one behind us), "the parser looks at that and basically comes out with three things: *put* is the verb, *brown bag* is the direct object, and *trophy case* is the indirect object. Thus, where most adventures are limited to a parser that can only handle two words, our parser takes full sentences."

Old Pictures in New Frames. Blank also explains that *Zork* on the pc was quite different in spots from the original mainframe version. *Zork I* is two-thirds from the original and one-third brand-new, *Zork II* is half and half, and the just-released *Zork III* is one-third old and two-thirds new. A black and white checkerboard figure looks over our shoulders as Blank discusses the depths of subtlety that *Zork* plumbed.

"If you're really in a place that's very foreign, very mysterious, nothing should be taken at face value. Everything should be explored," Blank advises. "For example, in *Zork II*, the Oddly-Angled Room was sort of a joke, like the way Beethoven would write a scherzo. The minuet movement was a very formal thing, the third movement in symphonies. Beethoven turned it into a scherzo, which means joke, and did funny things to a movement that is normally a very rigorously stylized thing.

"We decided, in the same way, that this maze was going to be different. You," Blank says, meaning us, "think you know how to do mazes. Here's a maze that you can't map. It's basically to tell people 'Don't always think that a maze is a maze!' "

One of the big breakthroughs with *Zork* was the development of multisolutions to the same problem. The cyclops in *Zork I* could be put to sleep by feeding him the right food or, if you ever happened to chance upon saying Ulysses, he would flee from the room. Blank offers a rare piece of *Zork* trivia. "Do you know that there is actually a clue to saying Ulysses or Odysseus? The commandment in the prayer book in the temple starts off with saying: 'Commandment 29, 160—Oh ye who go about saying unto each other, "Hello Sailor." ' If you look at the first letter of each line going down the side, it reads 'Odysseus'!"

Beware the Fork. Hearing a mind-curdling scream from behind an unmarked door, we open the door onto a view of a demonic black temple. "What's that?" we yell. Blank swiftly closes the door, saying, "It is not time for you to know."

Somewhat shaken by this vision of blighted evil, we turn for comfort to a more familiar subject: Infocom's revolutionary breakthrough in the blossoming field of computer novels, *Deadline*.

"*Deadline* was our hardest project yet to implement," Blank comments. "People moving around—the idea that characters can walk a path by themselves. You can interrupt them and sometimes change their future moves completely, like switching train tracks. If you ask them about something, their answers depend on what you know. If you've shown them this, but not that, you'll get one answer. If you have shown them that, but not this, you will get a different answer. And, if you've shown both things to the person, you'll get a third, entirely different answer. If you ask someone about something before it happens, they'll claim to have no knowledge of it.

"In *Deadline*, things are waiting for you to do something. You are an active force. It's possible that if you don't do anything in the game, nothing will really happen. There are thirty different endings possible. The newspaper headlines at the end convey how close to the best possible solution you were. When you finally satisfy this very finicky jury, you get, on the screen, the author's summary of what actually occurred.

"We pride ourselves on anticipating the things people will try to do, so that there'll be meaningful responses in the game and not just the old standard 'nothing happens.' *Deadline* is our best effort to date in that regard. It adds a sense that there is more going on in the game than what you see."

This Way to Debriefing. Lebling rejoins us, the natives having dropped him off from canoeing on the Charles River. He's all excited about Infocom's first science fiction adventure, *Starcross*.

"Just as Mark is almost entirely responsible for *Deadline*, *Starcross* is mostly mine," Lebling smiles. "I have always been a science fiction fan and have wanted to do an adventure in the genre. That's one of the things I really like about Infocom. We figure out what we really want to do, rather than design games by market demand. I'm in this to have fun. It would be nice also for Infocom to make lots of money and be very successful, but I couldn't work if I wasn't having fun doing it. I love writing these games—much more than I enjoy playing them.

"*Starcross* was a real joy to write and should be a lot of fun for people to play. The puzzles are science fiction puzzles, not adventure puzzles. We did not want to do a 'Zork in Space' game. *Starcross* is intended as an entry level game for people who like science fiction but who haven't played many adventure games before."

The airlock puzzle that begins *Starcross* is worth the price of the whole game for its cleverness of design. Even the packaging of the game is extraordinary: the disk comes in a large flying saucer that's reusable for storage—and it really flies. Enclosed is a special color space map and a detailed manual. The map figures prominently in getting the game started.

Let 'Em Eat Disks. Referring to this and the excellent *Deadline* package, Berez puts forth the innovative idea that "merchandising can be a deterrent to piracy. People want all the goodies inside. That's the position Infocom is taking in the marketplace, in the sense that we're discouraging piracy by making the add-ons so at-

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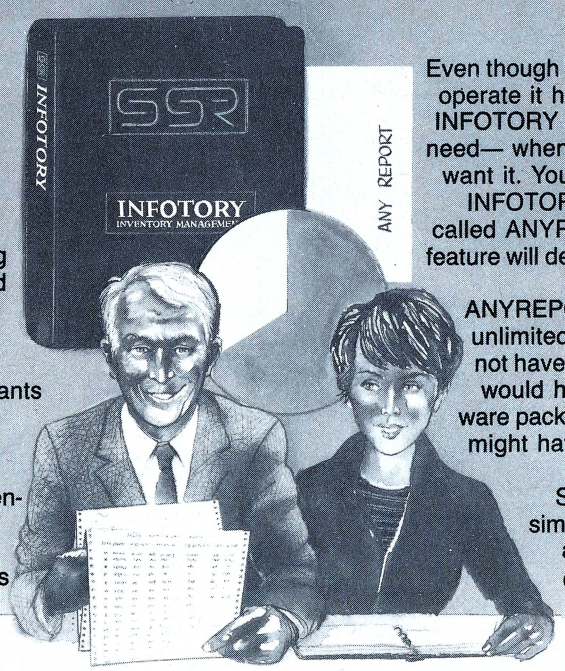

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tractive that people are willing to pay for them rather than settle for a pirated disk without the paraphernalia."

The outer door of the *Starcross* suddenly clangs shut and we hear the airlock recycling. Then the inner door opens in front of us and out steps the surprise we'd been told to expect: a cyborg! Michael Berlyn lights the room with his elfin grin. Now many of the strange things we've been seeing and experiencing throughout our visit begin to become crystal clear.

Sitting in the shade of the two ancient stone guardians of the Underground Empire, sharing a box lunch, Berlyn tells you of his journey to Infocom.

"It all started when Marc and I were introduced at a computer fair. We hit it off so well that we decided right there to do a collaboration. Later on it looked like it would be better to go beyond collaboration and actually join up with him. I'm very glad to be here."

The future and its promises excite Berlyn. "I have two science fiction games planned. One is a collaboration with Dave and Marc. We intend to introduce some brand-new elements into the adventure genre with this game. I'm also working on a book called *After the Change*—it's six hundred pages long, so far.

"Being offered a position in this company is the pinnacle of my career. I'm into squeezing and wringing every ounce of energy, experience, creativity, and application out of myself that I can. I perceive Infocom as giving me the space, the time, and the opportunity to do just that."

Great excitement reigned at Infocom upon Berlyn's decision to join them. This was not just a sudden, unplanned happening. Berez explains: "Since the summer of 1979, we've realized that our whole system lends itself to the talents of a professional writer. We've wanted to bring in people who could put most of their effort into writing good stories. Michael Berlyn—a published science fiction author with computer experience—is ideal. It's possible that what we're producing will become the novels of the future, and you're not going to want to read novels written by programmers. So we're providing new tools for writers to use to get their points across in new ways."

Blank discusses those tools and Berlyn: "Having Mike Berlyn here is one of the biggest pluses we have for the future. He's an excellent writer. He has lots of great ideas for sophisticated games that couldn't be implemented within the restrictions of Basic. With access to our technology, he'll be able to develop them. We're trying to extend the concept of the adventure story to where the player is a character and feels like a character, a part of the story, and not just like some being solving problems."

What Dreams May Come. Our lamp flickers; our remaining time here is short. If we're to learn about the future of Infocom, we must listen now. Berez complies.

"Al and I have just completed a business plan—about two inches thick. It establishes where we are today and where we want to go—the old five-year plan.

"In the future, we'll branch out from entertainment into other areas. For next year, there are five entertainment programs scheduled.

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Both Al and Joel felt that IBM pc sales were going to account for a large percentage of Infocom's business in the future. As Joel points out, "Infocom must be one of the leading developers for the IBM. People seem to appreciate that our games run a little faster on the pc than on the Apple. The disk access is a lot faster.

"The July poll in *Softalk for the IBM* showed that three of Infocom's products made the Top 20. *Deadline* was fourth, *Zork I* was eighth, and *Zork II* was seventeenth. That's quite a showing in what's supposed to be a business software market. Actually, the business market is one of our best markets. We've sold more games to people with business machines than to those with home machines. People who buy machines for business purposes have the same interest in playing a game from time to time as anyone else. Adventure games are intelligent games that businessmen will play, and IBM recognizes this. They made *Adventure* one of their initial software products."

Our lamp is very dim now, and we can hear the baying of the grues in the distance. So, with a last whiff of the Perfect Rose, we bid Infocom adieu. Marc Blank leads us to a cell and waves as he sets a dial and pushes a button outside. As we pass through the Great Door, we hear the Wizard mutter an "F" word, and we leave with a warm glow in our hearts that will never leave. ▲

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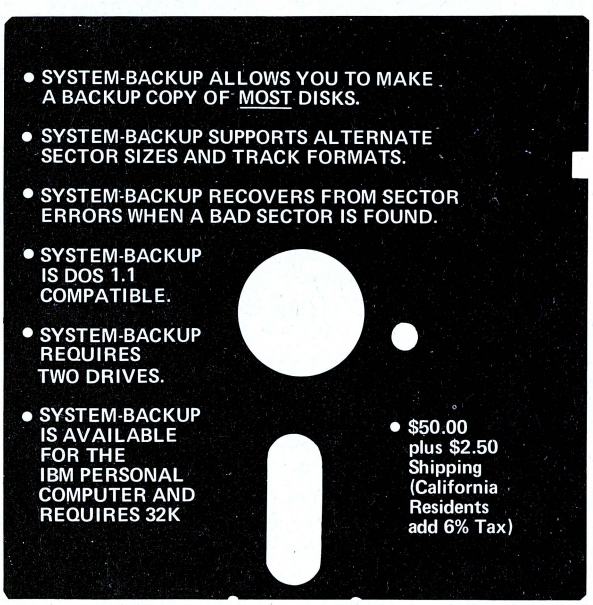

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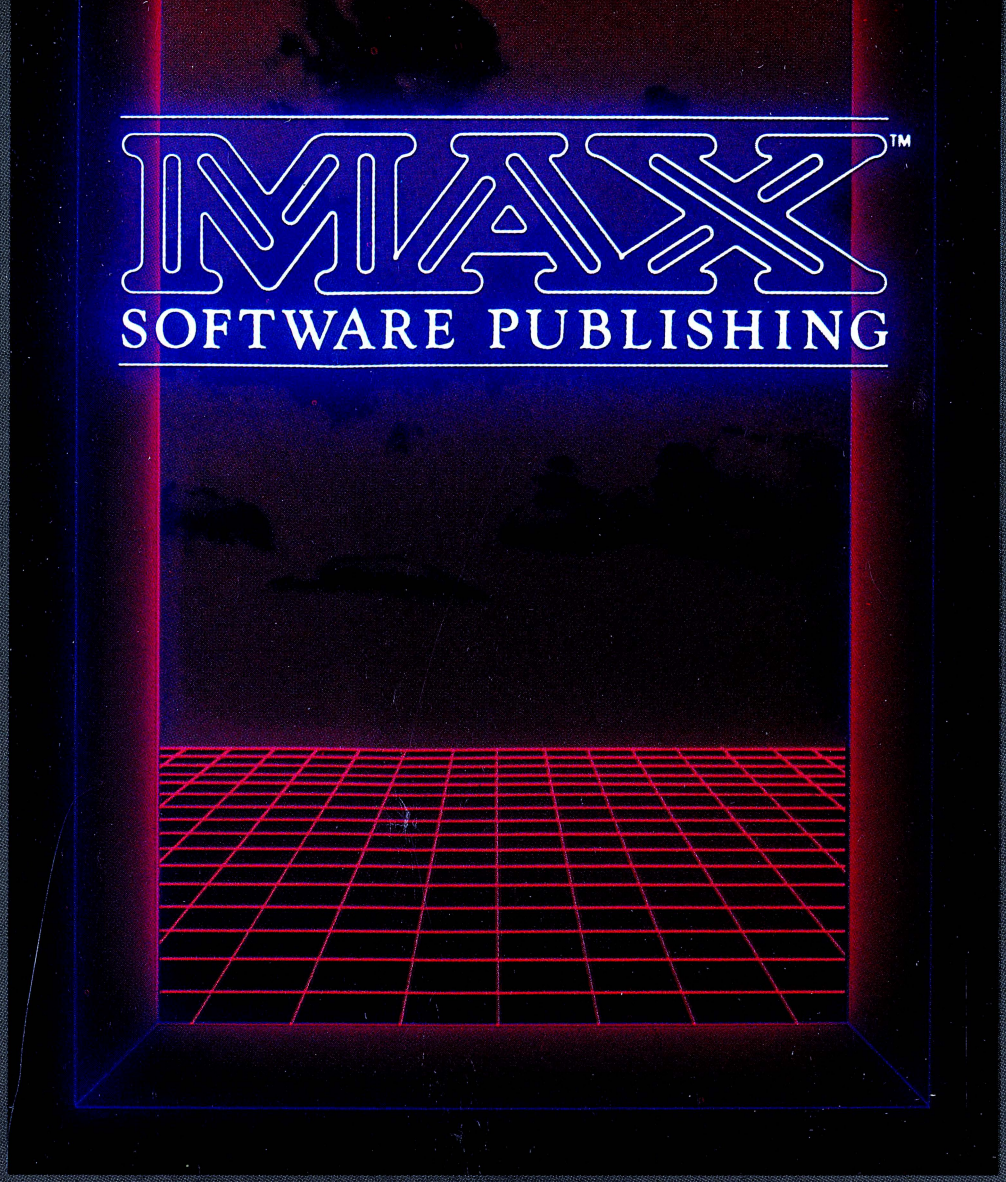

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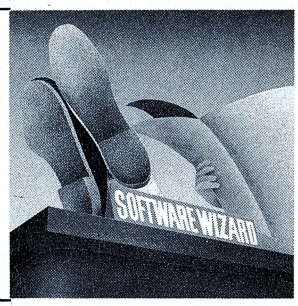

Δ **IBM** has authorized 37 additional retail outlets, bringing the total (including Computerland, Sears Business System Centers, and IBM Product Centers) to 425.

Δ **Software Arts** (Wellesley, MA) has a new address. The 30,000-square-foot building, which formerly housed the Rounds Chocolate Company, triples the company's office space. Software Arts's fifty employees work in a totally automated office with a CRT on nearly every desk. The new address is 27 Mica Lane, Wellesley, MA 02181.

Δ A marketing study by **Lebhar-Friedman** (New York, NY) predicts annual home computer sales will jump to eight million by 1985. Retail outlets will increase almost ten-fold, to 32,000, and sales will increase over twenty-fold, to $5.26 billion. Computer prices will average under $150, but the first-year purchase will average $666 as more sophisticated accessories become available.

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Δ **Hayden Publishing** (Rochelle Park, NJ) has formed the Hayden Software Company. The president is **Oscar Ray Rodriguez**, who was previously president of American Business Systems. Before forming the new company, Hayden had published software through a division of its subsidiary, the Hayden Book Company.

Δ **Intel** (Santa Clara, CA) has formed a Software Distribution and Support Operation (SDSO) to replace its Software Distribution Operation (SDO). The new division will provide distribution and support for Intel and third-party software, particularly for 8086 and 8088-based systems.

Δ **Eagle Computer** (Los Gatos, CA) has contracted to purchase six million dollars' worth of S1410 Winchester drive controllers from **Xebec** (Sunnyvale, CA) over a two-year period. Xebec is also supplying a million dollars' worth of controllers to **Tecmar** (Cleveland, OH).

Δ *Sourceworld Newsletter* is a monthly publication from **The Source** (McLean, VA). It replaces *Sourceworld Magazine* as the free news organ for Source subscribers. Meanwhile, a survey shows that the average age of Source subscribers is increasing. It now stands at forty-two, up three years from 1981. Sixty-four percent are over age thirty-five, compared to 56 percent last year. Also, the Source is increasingly being used for business. Twenty percent now use the Source most often at the work place. Fifty-three percent spend at least half their time on the Source for either their primary or secondary occupation. Sixty percent work in fields unrelated to computers.

Δ **David E. Meyers** is the new sales and marketing manager for **Eastern Software** (Baltimore, MD). He is a twenty-four-year-old graduate student who earlier worked as a sales representative for the P-J Engineering Sales Co.

Δ "Mind Tools from ESI" is the name of a forthcoming series of interactive software textbooks published by **Howard W. Sams** (Indianapolis, IN), a subsidiary of ITT. Each package will include an instruction book and a disk with spreadsheet templates for *VisiCalc*, *SuperCalc*, or *Multiplan*. The books will be sold through computer stores and book stores, including B. Dalton. Mind Tools is a product of **Expert Systems, Inc.** (Redmond, WA).

Δ **Glenn Sirkus**, co-owner of **Hayes Microproducts** (Norcross, GA) until his departure from the company in July, reports that he is sailing his boat, working on his tan, and generally "enjoying my first vacation in eight or nine years." He is doing some consulting but has received no long-term offers that he is "ready to jump on."

Δ **Richard M. Brenner**, former vice president of the U.S. Rail Services subsidiary of United States Leasing International, has joined **Corvus Systems** (San Jose, CA) as chief financial officer. He will be responsible for the firm's financial management operations and investor relations. **Avery Dee**, director of planning, has been promoted to the position of vice president of corporate planning. He will supervise development of corporate management and business growth plans for the firm as well as handling corporate legal matters and contract negotiations. **Augustus Allen** is Corvus's new director of human resources, with overall responsibility for affirmative action requirements, employee relations, and personnel recruitment. He was previously manager of manpower resources for Diablo Systems. Corvus sales for the fourth quarter of the fiscal year were up 102 percent over 1981, with net income for the year increasing from $10.3 million to $26.8 million.

Δ **Avant-Garde** (Eugene, OR) has appointed **Robert M. Tappan** as new sales and marketing director. "We are in the process of developing a more refined and sophisticated approach to our marketing strategy," says Tappan. "We will be breaking an all-new advertising campaign this fall and will be working closely with our distributors and dealers beforehand to ensure that the new program is coordinated properly, so that we all profit from our efforts." The software company's new national sales manager, **Steven D. Hanson**, will be in telephone contact with dealers and distributors for information on products and support materials.

Δ **Leading Edge** (Canton, MA) has appointed **John E. Fisher** technical support manager for the company, the first step in building a comprehensive service capability at the Canton facility, and the first of a series of steps to build a field service organization. Fisher was formerly product support and program manager at Honeywell Information Systems's field engineering division. ▲

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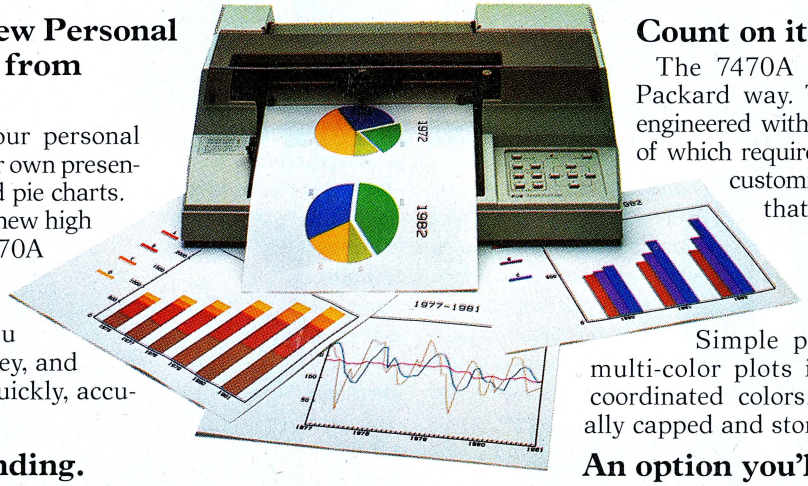

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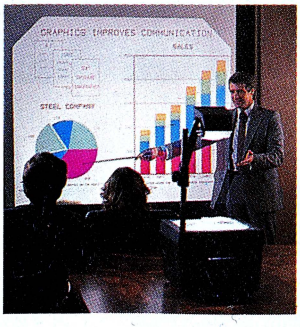

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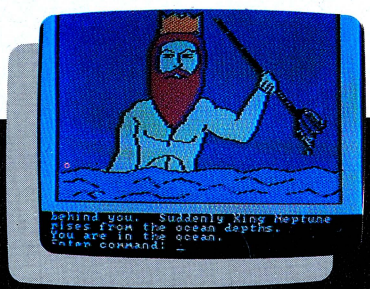

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BOARDS & BUSES

by Richard Kaapke

The IBM Personal Computer is capable of addressing a megabyte of memory. And while there currently are some limitations on the amount of memory you can physically mount in your system (see Boards and Buses, July 1982), it's clear that you can put at least half a megabyte in there. Half a megabyte is a lot of ones and zeros.

With that much memory available to them, it's not surprising that almost all pc owners have some kind of disk storage system (although the Personal Computer can do plenty of useful work with nothing more sophisticated than a cassette tape recorder for permanent storage). Probably the most popular storage configuration at this time consists of two single-sided 5¼-inch floppy disk drives. But there are many other options, and we'll look at some in this month's column.

Disk drives come in many sizes, accepting disks that range from just over three to more than ten inches in diameter. Floppy disk drives usually accept either 5¼-inch or 8-inch disks. Recently the market has seen the introduction of 3¼-inch disks enclosed in hard plastic cartridges; Sony uses them in its new SMC-70 computer, and the Amdek Corporation has recently announced a 3¼-inch drive that will be compatible with the IBM Personal Computer.

Floppy versus Hard Disks. A floppy disk is a small, flexible piece of Mylar (or similar plastic) coated with a magnetic oxide. The coating is such that minute particles can be reliably and stably set into either of two states of magnetic polarity; hence its suitability for the storage of binary-encoded data.

The disk is enclosed in and spins within a protective plastic jacket; the jacket has a soft inner surface that cleans the disk as it spins. Because the jacket has openings for the disk drive's read/write head and spindle, a floppy disk is vulnerable to various contaminants: dirt, fluids, and magnetic fields. Still, if given proper care your floppy disks can be useful for years and years.

A hard disk is usually an aluminum platter coated with a very smooth, polished magnetic oxide. The nature of the medium is such that hard disks can pack data much more densely than their floppy cousins. Hard disks are either sealed irremovably into their drives, in which case they're commonly called Winchester disks, or they're stored in a hard plastic case or cartridge which, when inserted into the drive, allows a read/write head access to the storage medium, but which seals the disk from physical contaminants when the disk is removed from the drive. Removable platters are not vulnerable to house dust and smoke the way floppies are, but the data they hold can be corrupted by magnetic fields.

Hard disks are made to much more exacting standards than are floppies. A hard disk cannot function if it wobbles or moves in any way other than its intended spin. Hard disks are attached to metal spindles, and if you dropped one, the small tilt that the impact would impart to the spindle not only would ruin the disk but could even ruin the read/write head of your drive if you tried to apply it to the tilted disk.

You can usually get away with dropping a floppy disk, provided you have it enveloped in its protective paper jacket. And even if a floppy is slightly warped or dirty, it's not likely to do permanent damage to a read/write head. Any contaminant that reaches the head will indeed foul up the operation of the drive, but you can usually remedy the matter by cleaning the read/write head and replacing the troublesome disk.

Both hard disks and floppies organize data storage in tracks and sectors. Tracks are concentric rings of a given width; sectors, also known as blocks, are subdivisions of tracks. All tracks on a disk are of uniform width and contain the same number of sectors; and each sector will store the same number of bytes.

The number of bytes per sector, sectors per track, and tracks per disk are determined by the operating system under which the disk is used (within limits set by the disk controller card). Operating systems vary considerably in the way they allocate these storage units, which is one reason why a disk formatted to run on one brand of computer will not, as a rule, run on another.

IBM currently sells two kinds of floppy disk drives for use with the Personal Computer. The one that was made available with the original release of the machine reads and writes on only one surface of the floppy disk—the bottom. The top surface, the one bearing the disk label, is not used for data storage in this drive. On the single-sided drive a small felt pad presses on the top surface of the disk, pushing it a short distance into contact with the read/write head.

Double Your Fun. With the release of DOS 1.1 earlier this summer, IBM also announced the availability of double-sided disk drives. These actually have two read/write heads, one for each surface of the disk. And, as you would expect, they allow you to get twice as much storage per floppy disk.

How much is twice as much? Well, PC-DOS formats disks into forty tracks of eight sectors each, with each sector holding 512 bytes. That number, 512, is exactly half a kilobyte (a kilobyte is two to the tenth power, or 1,024), so the storage capacity of a disk formatted under DOS is forty times eight times one half, or 160, kilobytes. A two-sided disk will give you 320K.

Disks that are to be used on two-sided drives are just like their one-sided counterparts, except that both recording surfaces are certified by the disk manufacturer to be suitable for data storage. The write-protect notch for the first surface is also the write-protect notch for the second, so a two-sided disk is either entirely write-protected or entirely write-enabled.

DOS doesn't get the maximum possible storage from a 5¼-inch floppy disk. It is possible, by pushing the disk closer to its operating limits, to get ten sectors of 512 bytes each on a track, instead of eight.

For those wanting still more storage on floppy disks, other kinds of drives are available. The standard IBM Personal Computer drives, which are made by Tandon, are configured to recognize a maximum of forty-eight tracks per inch (TPI). Tandon, however, also manufactures a 96 TPI drive. With this so-called double-tracking drive reading both sides of the disk, you could get as much as 800K of storage per disk.

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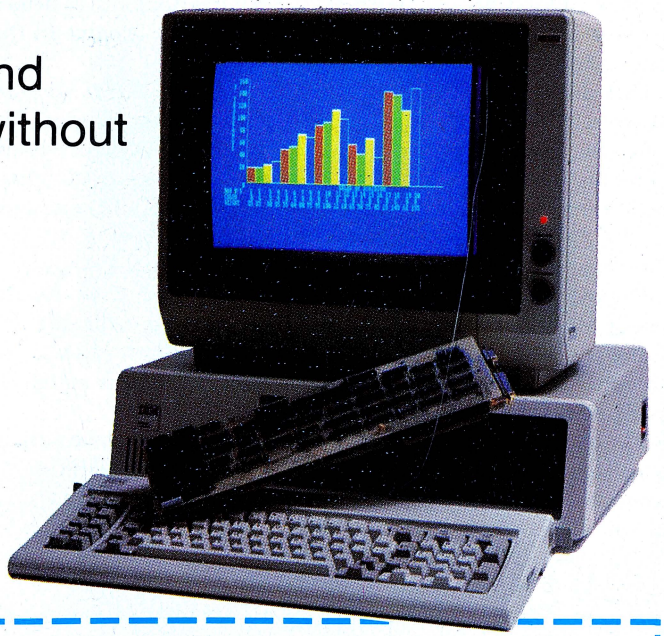

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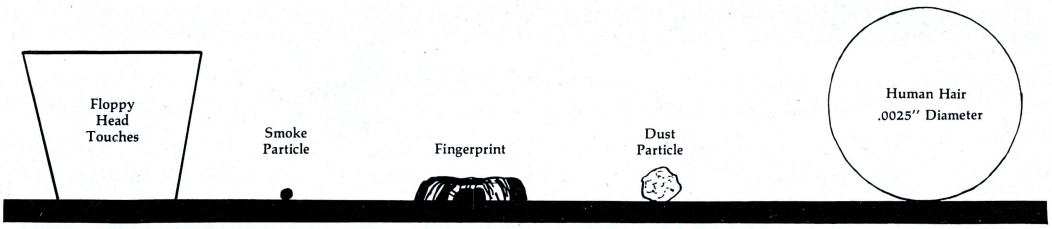

This diagram shows the relative sizes of the three most common floppy disk contaminants. The human hair, an unlikely contaminant, is shown for comparison.

In order to get that double-tracking Tandon drive to work with PC-DOS, you'd need to make some changes to the operating system. These changes are not documented anywhere, but sooner or later people will discover how to make them, the mysteries will be revealed, and the 800K floppy disk may become a popular alternative to the standard recording format.

Eight-Inch Disks. Another alternative is the 8-inch floppy. Eight-inch floppy drives have been connected to the Personal Computer. These drives, however, have to be located outside the system cabinet, and you must still have at least one 5¼-inch drive in your system. This requirement makes for a bit of confusion and necessitates the purchase and use of two different sizes of disk. The awkwardness, in combination with the fact that IBM software is distributed only on 5¼-inch disks, makes it unlikely that 8-inch drives will ever become popular on the pc.

The 8-inch floppy disk has, however, been a popular medium on other computers, including most CP/M-80 machines. The 8-inch drive was pioneered by IBM in its 3270 series. For the 3270 machines, the initial program load (IPL) information, which got the computer up and running, was stored on an 8-inch disk.

The IBM 3270 format for 8-inch disks divided the disks into seventy-seven tracks of twenty-six sectors apiece. The sector size was only 128 bytes, so the total storage per disk was a modest 256K. Technology has advanced some since the 3270s came on the scene; 8-inch drives now typically read twice as many sectors per track and both sides of the disk. If a double-tracking 8-inch drive is made, it will enable you to store as much as two megabytes on a disk.

Even though two megabytes per disk sounds pretty worthwhile, the trend seems to be toward physically smaller storage units. The 5¼-inch floppy disk, popularized by the Apple II, seems to be with us to stay—unless, of course, it gets supplanted by those 3-inch upstarts.

Whatever disk system you use, you need some kind of controller card to supervise the transfer of data between memory and disk. The IBM disk drive adapter will handle both 8-inch and 5¼-inch floppy drives, but it won't work with hard disk drives.

Hard disks therefore require a special controller card, as well as their own power supply and operating system software. Some manufacturers also require that the hard disk be located outside the system cabinet, although others fit their drives into the cabinet's B drive location.

Hard disks may sound like more trouble (and expense) than they're worth, but they're much faster than their floppy counterparts and, byte for byte, less expensive. A hard disk can make anywhere from five million to twenty million bytes of data almost instantly available. To have that many characters on-line using 320K floppies, you'd need fifteen or more drives. Speed of access for hard disks is typically on the order of ten times greater than for floppies; BasicA, for example, will load from a hard disk in less than a second.

Backing Up Hard Disks. Most hard disks for use with the IBM Personal Computer are of the fixed type, meaning that the disk is sealed into the drive. With this kind of disk it's mandatory that you back up data onto removable media, like floppy disks. Backing up a hard disk onto floppies can be quite a job, depending on the capacity of the hard disk and how full it happens to be. Some backup programs make this process a little less painful by allowing incremental backup; such programs check the date and time of creation for each file and only copy those that have been changed or created since the time of your last backup.

Some hard disk manufacturers also sell a cartridge tape backup system that can fill a high-density, twenty-megabyte magnetic tape cassette in twenty minutes. Time, storage space, and money can all be saved in the long run by such systems, in spite of the fact that the systems themselves often cost more than $300.

Another solution to the backup problem is the removable hard disk. Some sealed hard disk drives come equipped with a slot for a removable hard disk cartridge. One advantage to this approach is speed; copying data between a fixed platter and a removable one is quite fast and easy. Cost of the removable platter is likely to be $200 or more.

Before you go out and buy a hard disk drive, consider the uses you'll put it to and the amount of data storage you really need. If you're uncertain about the latter, consult a knowledgeable salesperson. Also check on the compatibility of the unit; how well does it work with the pc? And ask about backup procedures. Since some drives cost more than your computer itself, you'll want to make a careful choice.

IBM doesn't yet offer a hard disk drive for the Personal Computer, and they'll neither confirm nor deny plans to sell any such device in the future. It's reasonable to suppose they might offer one eventually, however. If you prefer to use only equipment manufactured or supported by IBM, you might do well to sit tight. ▲

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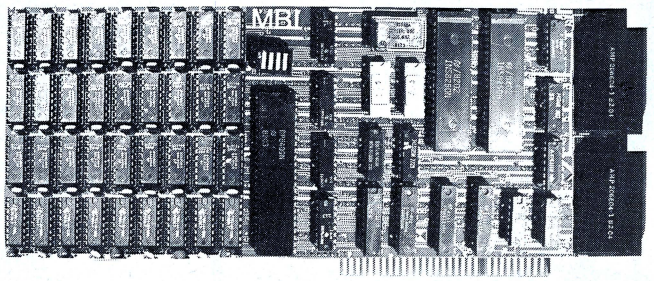

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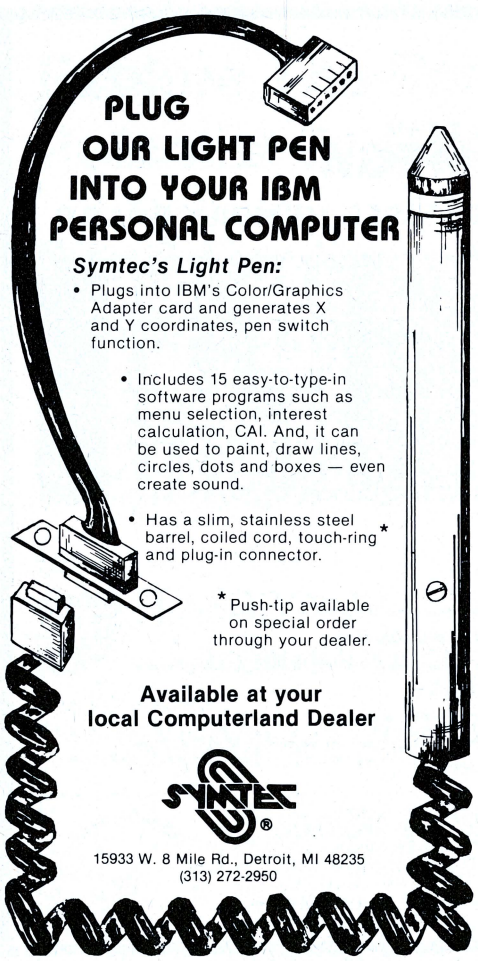
THE PROFIT PLOT

by Shirley Fisher

Last month we discussed the erosion of your dollar's purchasing power in times of high inflation. We compared several periods to the year 1951 and talked a bit about what your money could buy at different points in time, compared to what it bought in 1951.

We also promised to show you this month how to construct bar charts, using nothing more than your electronic spreadsheet and a simple printer.



Quite often you'll have statistical data that you've gathered for some purpose in your business. Frequently you'll find yourself wanting to present a page of figures in a manner that your audience can grasp quickly. As the old cliche says, a picture is worth a thousand words; and a bar chart may be worth a thousand numbers.

In most charts you will see what is referred to as the *time line* represented across the page on the *x* axis. Your other variable is represented on the *y* axis. This is not a hard and fast rule that must never be broken, but only a typical method of representation. Sometimes the information you have to present may lend itself better to the opposite style of display, with the time line along the *y* axis. No problem; just set it up that way.

Last month we compared the value of the dollar in 1956, 1961, 1966, 1971, and 1978 with its value in 1951. Here are the figures we used:

YEAR	CENTS
1951	100
1956	96
1961	88
1966	79
1971	63
1978	40

For our purpose this month, we'll work with two popular spreadsheets—*VisiCalc* and *SuperCalc*. Differences between these programs will be explained as we go along.

The easiest bar chart to construct, with either program, is the one in which the bars are oriented vertically. In this chart we'll use the *x* axis for the time line and the *y* axis to represent our shrinking purchasing power.

First we need to mark the *y* axis. In cell A1, enter the value 100, and at A2, enter the formula −1+A1. You can play around with the visual representation of these numbers by making them flush left, flush right, dollar format, or whatever strikes your fancy. When you have them the way you want them, replicate the formula at A2 down the page as far as A100. Both spreadsheet programs allow you to set the individual variables in the formula you're replicating to unchanging cell reference or relative cell reference; for this application, of course, we want each line to have a relative reference.

Next, draw the *x* axis along row 101, from column B to column G. In *VisiCalc* you can do this by using the repeating label command, /−−. This command fills the width of the column with whatever character or string of characters follows the /−. After you have cell B101 filled with hyphens, you can replicate that cell from C101 to G101.

The procedure for repeating a label is a little different in *SuperCalc*. In that program you can go all the way across the page by using the repeating string command '−. You'll discover when you do this that you create a dashed line much longer than you need. That's easy to fix. Simply move to H101 and type a single quote followed by a space; the extra horizontal separators disappear!

Rows 102 and 103, directly below the *x* axis, will hold labels for the years and their corresponding dollar values. Format these locations flush left or right, as you choose, but enter the years in row 102 and the values of the dollar (expressed in cents) in row 103. That is, put 1951 in B102, 100 in B103, 1956 in C102, 96 in C103, and so on.

The rectangle from B1 to G100 will display your data. At B1, enter the formula:

/F*@IF(B103>=A1,9,0)

This formula fetches the value of the 1951 dollar, as shown in cell B103, and checks to see if it's greater than or equal to the *y* axis coordinate of B1. If that condition is true, the formula returns the value 9; otherwise it returns the value 0. Either value, 9 or 0, is expressed at cell B1 in graphics format. That is, if the condition is true, you get a row of

	A	B	C	D	E	F	G	H	I	J	K	L
1	YEAR:	AMOUNT	10	20	30	40	50	60	70	80	90	100
2												
3	1951	100	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
4												
5	1956	96	**********	**********	**********	**********	**********	**********	**********	**********	**********	******
6												
7	1961	88	**********	**********	**********	**********	**********	**********	**********	**********	********	
8												
9	1966	79	**********	**********	**********	**********	**********	**********	**********	*********		
10												
11	1971	63	**********	**********	*********	**********	**********	**********	***			
12												
13	1978	40	**********	**********	**********	**********						
14												
15	YEAR:	AMOUNT	10	20	30	40	50	60	70	80	90	100

	A	B	C
1	1951	100	B1*50/MAX(B1:B11)
2			
3	1956	96	B3*50/MAX(B1:B11)
4			
5	1961	88	B5*50/MAX(B1:B11)
6			
7	1966	79	B7*50/MAX(B1:B11)
8			
9	1971	63	B9*50/MAX(B1:B11)
10			
11	1978	40	B11*50/MAX(B1:B11)

Above: the horizontal segmented bar graph in VisiCalc. *Right: the formulas to achieve scaling of a horizontal graph in* SuperCalc.

asterisks; if false, you get nothing.

Now you can replicate that formula throughout the graph. Start by replicating it down column B, from B1 to B100. The reference to B103 should be left unchanged in this replication, but A1 should be replicated with relative reference.

After you've got column B set up, you can replicate it through the remainder of the graph—into columns C through G. This time the source range for the replication is B1 through B100 and the target range is C1 to G1. And this time the references to cells in row 103 should be made relative and the references to values in column A should be maintained without change. You'll find you have to hit a lot of Rs and Ns.

That's all there is to it. If you want wider bars, you can change the column widths and adjust the figure 9 in your formula. For narrower bars, just shrink the columns; you won't need to adjust the formula.

Making a horizontal bar chart with either spreadsheet program presents some interesting possibilities. In this representation we wish to display the years and cents figures vertically in columns A and B and draw horizontal bars to represent the number of pennies corresponding to each year. If you have a printer that accepts a 132-character line, you have no problem. If your printer's maximum line is shorter than 132 characters, you'll need to scale. We'll cover scaling in a moment.

First, let's discuss our general plan for laying out a horizontal bar chart. With *VisiCalc* you'll need to make your columns eleven characters wide. You'll be using the graphics format, /F*, which automatically puts a blank space in the leftmost position of each column. Setting your column width to eleven will give you segmented bars that have ten asterisks per segment.

SuperCalc allows differing column widths within the same application, so you can set the width of column C to 101 characters, specify the graphics format, and display the entire graph in that column. Like *VisiCalc*, *SuperCalc* puts a blank space at the left of a column in graphics format, so you need to make that column 101 characters wide in order to display 100 asterisks.

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In *VisiCalc*, start by putting the numbers 10, 20, 30, and so on to 100, in cells C1 through L1. These will mark the values represented by the ends of each bar segment. In row 2, from A2 to L2, put in a horizontal separator, using either /-- or /-= as you prefer.

At A3 through A8, type the years 1951, 1956, 1961, 1966, 1971, and 1978, and at B3 through B8 the corresponding values—100, 96, 88, 79, 63, and 40.

For esthetic purposes you'll probably want to copy row 1 into row 10 and row 2 into row 9; that will make a nice frame for your bar graph. And speaking of esthetics, your graph so far may appear to be crammed together vertically, but because you'll be replicating formulas in a moment, it's best to leave it closed up at first and insert blank rows when you're finished.

At C3, enter the following formula:

```
@IF(@INT((B3-(C1-10))/10)>0,10,
  @IF((B3-(C1-10))>0,B3-(C1-10),0))
```

This looks complicated but is really very simple. What it says is this: Take a look at the number to be represented (stored at B3). Then subtract from that number the appropriate multiple of ten (expressed as C1-10). If the integer result of that remainder, divided by ten, is greater than zero, put ten asterisks in the cell. If the integer result of that remainder is less than ten, then either give us the remainder in asterisks or, if the remainder is a negative number, give us no asterisks.

Now that you have that formula in C3, replicate it from C4 to C8. Make the references to column B relative and those to C1 unchanged.

Finally, replicate the source range C3 through C8 into the target range D3 through L3. This time the (C1-10) expression gets relative treatment and the reference to B3 stays unchanged.

If you're using *SuperCalc*, you'll have a very wide column C. In order to make that column meaningful, you'll want to add a label at the top and bottom of your chart to mark off multiples of ten asterisks. Watch the position indicator at the bottom of your screen. When it says "11>" type in 10; then space over eight spaces and type in 20, and so on across the line. You'll only need seven spaces between 90 and 100. You can replicate this label from C1 to C10.

The formulas to be used in C3 through C8 are simple; they just pick up the values at the corresponding cells in column B.

All this is just great if you have a printer that can handle at least 132 characters per line. What if you are limited to 80, or if your chart is wider than 132 characters? This is where scaling comes into play.

Here's a way to scale with *SuperCalc*. Set columns A and B to the default width and column C to 51 characters (remember, you need to allow for that extra space between columns) and graphics format.

The scaling formula is easy. It's the value in column B, multiplied by one less than the width of column C. This product is then divided by the maximum value in column B.

In other words:

B1*50/MAX(B3:B8)

Because your range, B3 through B8, is the same for each calculation, the only value that changes when you replicate this formula down column C is the first reference to column B.

With *VisiCalc*, you may want to use column A to hold your range of values and use column B as labels containing both the year and value being represented. Then, when you print out your report, you'll only print columns B and C.

If you change the width of your graphics column, be sure to change the scale value in your formula to correspond to your new width requirements.

To scale a vertical bar chart, you need only change the formula in column A from -1+A1 to -2+A1—or any other scale factor of your choice. Try a few of your own charts just for fun. ▲

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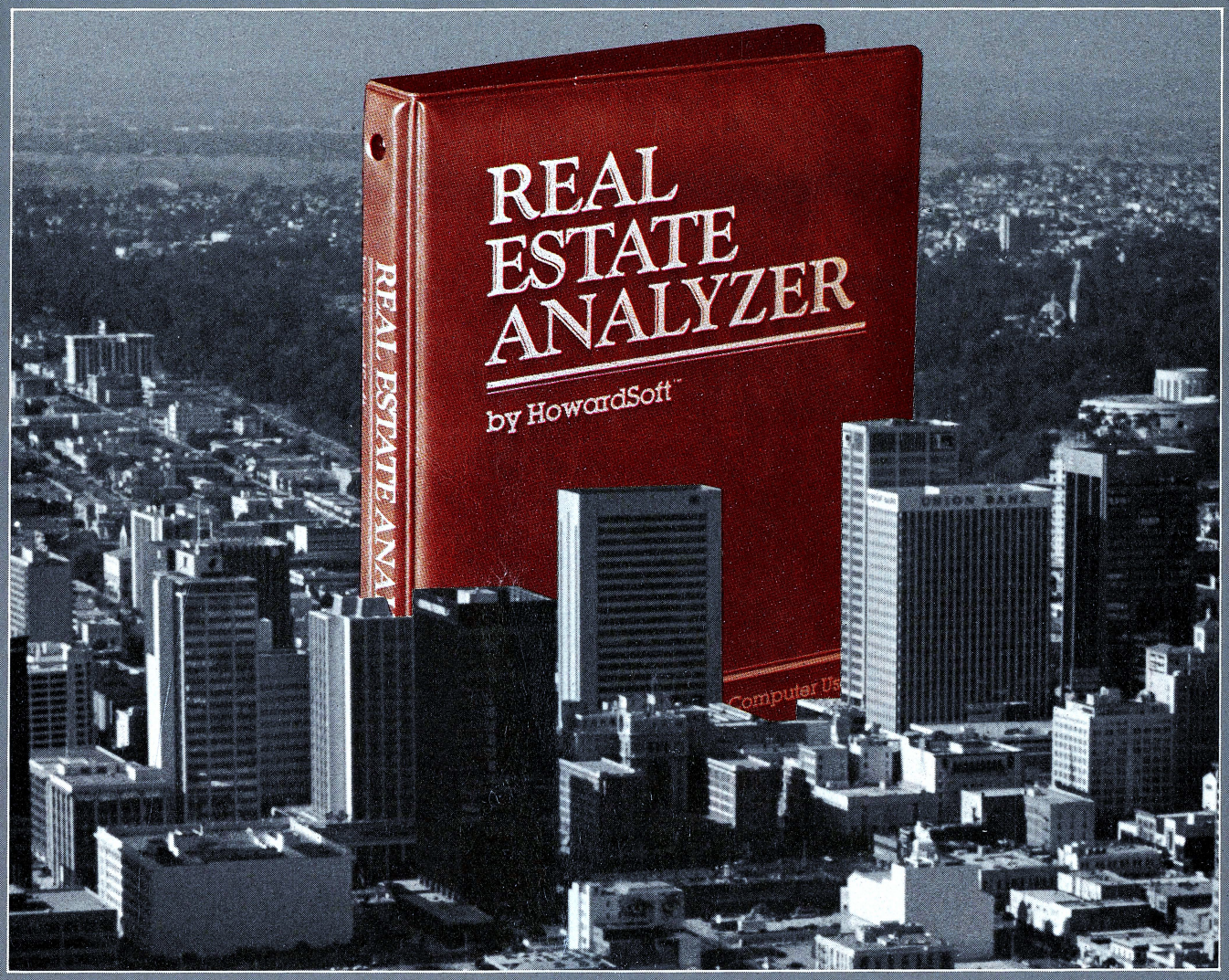

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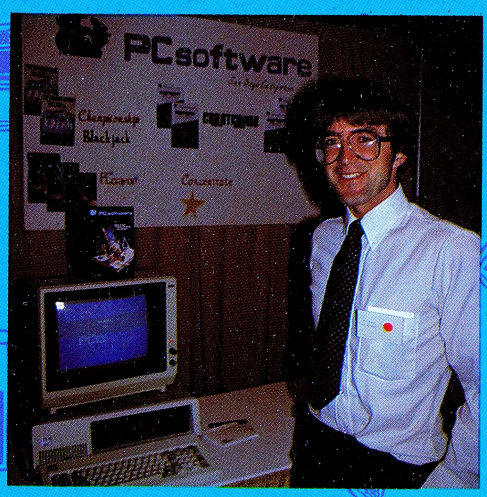
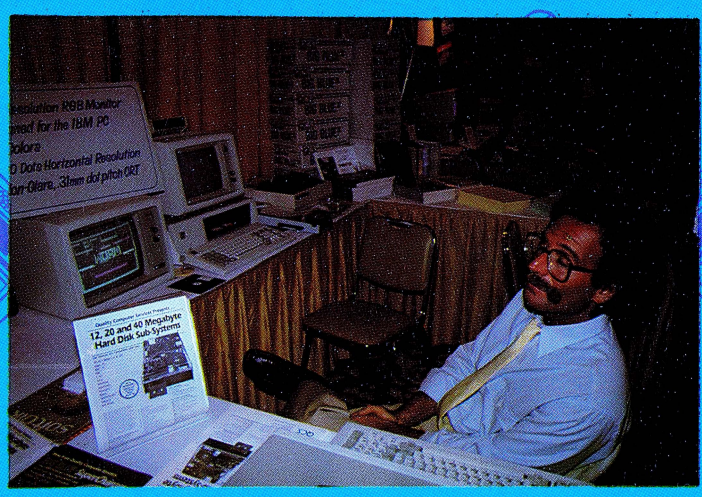
A Birthday Fest for the pc

by Craig Stinson





The scene at Atlantic City, clockwise from top left: David Guest, of Beaman Porter, gave nearly nonstop demonstrations of PowerText*; the Orchid Technology booth attracted users interested in monochrome graphics and local area networking; IBM brought enough buttons to bury a dancing elephant—and had to take most of them back to Boca; Arnold Geller, of Quality Computer Services, showed hard disk subsystems, an RGB monitor, and a Z-80 coprocessor board called Big Blue; and Joe Juhasz, of PCsoftware, held tournaments on his company's* Championship Blackjack *program.*

The IBM Personal Computer is now a little over a year old. In honor of its first birthday, the national user organization Personna held a trade show last month at the Golden Nugget in Atlantic City. Titled PC+1, the show was the first of what one assumes will be a series of events devoted exclusively to products for the pc.

As such, it was a modest beginning. About thirty-five exhibitors hawked their wares before perhaps twenty-five hundred attendees over four days. The viewers seemed mostly to represent sizable corporate interests, which was surprising considering the fact that the show was sponsored by a group that represents end users. Even on Saturday, the show's closing day, the individual pc consumer was mostly in absentia; perhaps Atlantic City was a little too remote to lure him from his keyboard and screen.

The show, however, did underscore some trends developing in the IBM marketplace.

A number of companies are working to enhance the graphics capability of the pc; three of these firms were on hand at PC+1. Frederick Electronics (Frederick, MD) and Discortex (Hicksville, NY) displayed hardware alternatives to the IBM color/graphics board. Both products offer sixteen independent colors in medium resolution and the usual choice of two palettes in high resolution; Frederick's Colorplus additionally claims total compatibility with BasicA graphics commands. Meanwhile, Orchid Technology (Milpitas, CA) was showing an alternative monochrome adapter that produces high-resolution graphics on the monochrome screen.

Orchid was also one of two companies at the show selling local area network systems; the other was Novell Data Systems (Orem, UT). Orchid's PCnet connects any number of users over coaxial cable to distances up to 7,000 feet; the system is compatible with DOS 1.1 and requires an adapter board in each computer on the network. Novell's system, called Nolan, is supervised by a 68000 processor and allows up to twenty-four users on-line.

For single-pc, multiuser applications, Quantum Software Systems (San Jose, CA) was on hand with its Qunix operating system. Qunix, a Unix lookalike, permits a maximum of eight terminals to share a common pc and allows that pc to perform as many as 250 concurrent tasks. Quantum Software shared quarters at the show with its marketing arm, PC/Software (San Francisco, CA), and Control Systems (Minneapolis, MN), a company that manufactures an eight-port serial board suitable for connecting a gang of Qunix users; the board is appropriately named Hostess. The Quantum booth drew more traffic than any other at the show.

Games. And speaking of PC/Software, there were two companies by that name at the show, distinguished only by a typographic variation. PCsoftware (San Diego, CA), who claim priority for their use of the name, was displaying what had to be the two software bargains of the fair: a comprehensive graphics utility program called *PCcrayon* and a database manager with a fast machine-language sort routine, called *Creatabase*; the programs were going for a mere $44.95 and $59.50, respectively.

PCsoftware was also demonstrating *Championship Blackjack*, one of two programs at the show that teach card-counting systems for blackjack players. Its competition came from Intelligent Statements (Raleigh, NC), who offered *Ken Uston's Professional Blackjack—the Ultimate Game, the Winningest System.*

Other game producers at the show included Aeon Concepts (Pittsburgh, PA) and Ensign Software (Boise, ID). The latter offered—in addition to several nongame products—their $29.95 *Games Package 1*, which includes several traditional strategy games (Othello, cribbage, four-way tick-tack-toe), a cryptology teaser, a couple of educational games, and games of the *Hammurabi* and *Star Trek* genres. Aeon's product, called *Microcosm*, is an instance of software imitating life—in this case the game of Life.

As a whole, the show's gamemakers displayed a distinct tilt toward the cerebral. Not a shoot-'em-up was in sight. In fact, there weren't even any games that required graphics. It may be that the division of the IBM marketplace into monochrome users and graphics users will have the effect of channeling gaming creativity away from imitation of the arcade world. Both Aeon Concepts and Intelligent Statements are promising a line of intellectually engaging divertissements aimed at the relaxing businessman as well as the more traditional game consumer.

Publications. The need for information of all kinds in the IBM marketplace was reflected by the presence at the show of three book publishers, a traditional magazine publisher, and a publisher of a magazine on disk. Que Corporation (Indianapolis, IN) was selling copies of its new IBM buyer's guide. *PC Magazine* (San Francisco, CA) narrowly missed getting their September issue, also a buyer's guide, off the press in time for the show. Que also presented a couple of new spreadsheet books for use with *VisiCalc* and *SuperCalc*, while CBS College Publishing (New York, NY) offered a Basic tutorial and the Robert J. Brady Company (Bowie, MD) displayed its already well known introductory volume on the IBM Personal Computer. Meanwhile, Carol Hall of Shreveport, Louisiana, was there to promote *I. B. Magazette*, a combination disk magazine, program exchange medium, and national user group.

Other business software on display included *PowerText*, from Beaman Porter (Harrison, NY), a unique word processor centered around a runtime version of the p-System editor; a spreadsheet program from B&L Computer Programs (Boise, ID) that requires graphics and features color highlighting capability; the celebrated database manager *dBase II* from Ashton-Tate (Culver City, CA); real estate and inventory analysis programs from Execuware (Charlotte, NC); and two program generators—*The Programmer*, by Advanced Operating Systems (Michigan City, IN), and *Metafile* from Metafile (Chatfield, MN).

On the hardware side, viewers got another chance to peruse the Tecmar line of pc expansion products. Tecmar (Cleveland, OH) had nothing new at this show, but the company's Dave Wertman promised an average of one new product per week between PC+1 and November's Comdex show in Las Vegas. Attendees were also given a shot at winning a memory board from Memory Technologies (Twelve Mile, IN).

From a hardware standpoint the novelty of the show was the micro-floppy disk drive marketed by Amdek (Arlington Heights, IL). The drive, made by Hitachi, reads a pair of three-inch disks, each encased in hard plastic and looking more like a cassette of recording tape than a floppy disk. The disks are double-sided and offer a storage potential of 250K per side. Amdek also showed off its new amber-screen monitor and a four-color flatbed X-Y plotter that sells for under $1,000.

Also on hand to celebrate the pc's first birthday was the proud parent. IBM had nothing new to show, but they did announce communications software that would enable the pc to emulate the IBM 3270 and 3101 terminals. The new capability will be available in January 1983.

Educational software filled about a quarter of IBM's booth space, quietly stressing the company's determination to secure an ample piece of that booming market. The busiest part of the IBM booth, however, was manned by a software acquisition team who corralled programmers as they ambled by.

A sample of exhibitors interviewed at closing time Saturday agreed that PC+1 had been, for them, a worthwhile and successful show. Most admitted that they wouldn't have minded having a few more potential customers drop in. But the small scale of the show provided opportunities sometimes missing at larger affairs. In particular, it gave exhibitors a lot of time to communicate—possibly to negotiate—with one another. Moreover, it gave some of the newcomers to the market a chance to test their wings in a relatively nonturbulent jet stream. Many of those same exhibitors will be putting up the booths again next month when the computer world reconvenes for Comdex in Las Vegas. ▲

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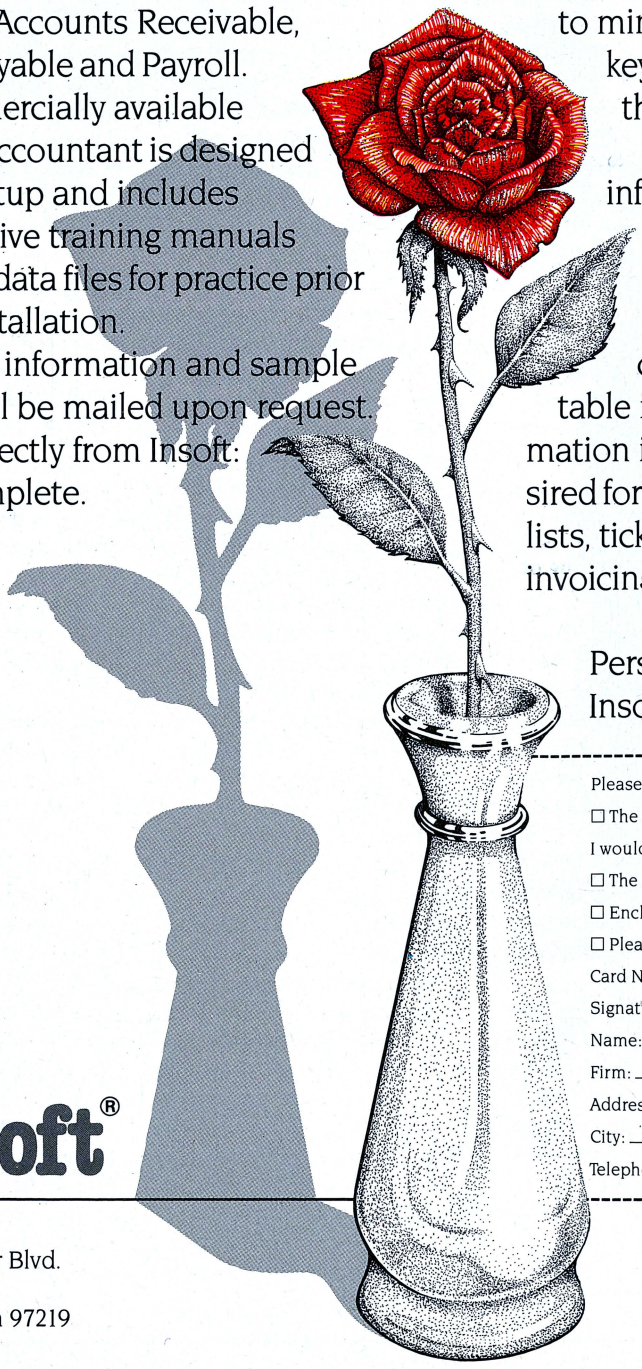

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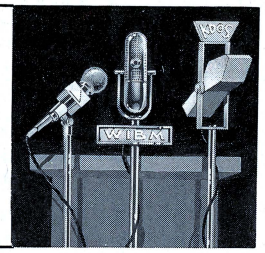

Unless otherwise indicated, software listed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

Δ **IBM** (Box 1328, Boca Raton, FL 33432; 305-998-2000) has released a Version 2.0 of its *Asynchronous Communications Support* program that allows a Personal Computer to be used as a TTY ASR 33/35 terminal. $60. Δ Coming in January: *IBM 3101 Emulation* will provide emulation of the named terminal and allow ASCII files to be transmitted to and from a host computer and local disk storage. ASCII files can also be converted to and from binary files. $140. Δ *SNA 3270 Emulation and RJE Support* will allow a pc to emulate either a Systems Network Architecture (SNA) 3270 terminal or an SNA 3770 Remote Job Entry (RJE). $700. Δ Synchronous Data Link Control (SDLC) Communications Adapter will provide the ability to communicate through a modem using SDLC protocols. The SDLC adapter is installed in one of the five expansion slots. $300. Δ A Communications Adapter Cable will connect the Adapter to a modem. $75.

Δ **System 300** (3030B Q Street, Sacramento, CA 95816; 916-452-1476) has announced a piggyback board that allows 256K to be placed on the motherboard, saving the use of an expansion slot. $649.

Δ **International Software Alliance** (1835 Mission Ridge Road, Santa Barbara, CA 93103; 805-966-3077) sells *E/Lync*, a communications program that allows program transfer between computers via modem or cable. It can also be used to allow the computer to function as a terminal for time-sharing or remote bulletin board systems. There is an automatic error correction protocol. $30. Δ *Lync* has all the features of *E/Lync* and also allows files to be fetched from remote systems and the use of wild card specifiers when sending or fetching files. *Lync* can display a local or remote directory and relog disk drives for both local and remote computers. $125.

Δ **Computer Aided Design** (764 Twenty-fourth Avenue, San Francisco, CA 94121; 415-387-0263) produces *Personal Secretary*, a calendar program that can display any date up to December 31, 2099. *Personal Secretary* can store up to twenty-one lines of information about any date. Expenditures may be recorded and summarized later by keyword search. Requires two disk drives. $55.

Δ **World Wide Software** (2555 Buena Vista Way, Berkeley, CA 94708) offers a Forth programming system. The company boasts that it is easy to understand, direct, has high-level programming power, and comes complete with its own editor and utilities. $75.

Δ **Ashton-Tate** (9929 West Jefferson Boulevard, Culver City, CA 90230; 213-204-5570) is the exclusive distributor of the program *FPL 3*, an enhanced version of the financial forecasting package, *FPL*. Requires Baby Blue (from Xedex). A PC-DOS version is coming. $735.

Δ **Versa Computing** (3541 Old Conejo Road, Newbury Park, CA 91320; 805-498-1956) sells a prototype board with more than 3,000 plated through-holes. $59.95.

Δ **Computer Systems Design** (Box 735, Yakima, WA 98907; 509-575-0320) is the creator of *Utility Billing*, a program designed to meet the needs of small and medium-sized utility districts. The system can maintain up to eight separate charges, maintain consumption and billing history, and produce summarized reports. $1,495.

Δ **KVA Associates** (2821 Camino del Mar, Del Mar, CA 92014; 714-755-0041) publishes *Survey*, a bimonthly summary of computer articles culled from magazines and trade publications. It is organized by computer brand and subject category. Subscription $37; sample copy $2.

Δ **Nat Hellman III, Inc.** (5951 East Firestone Boulevard, South Gate, CA 90280; 213-773-3576) offers a line of plastic accessories: a keyboard dust cover ($12), a disk drive cover ($8), a rack for reference manuals ($24), and a carrying case ($120).

Δ **Intermedia Systems** (10601 South De Anza Boulevard, Cupertino, CA 95014; 408-996-0900) sells a multifunction card that combines up to 512K with two RS232 asynchronous channels. $1,590 in maximum configuration.

Δ **Davong Systems** (1061 Terra Bella Avenue, Mountain View, CA 94043; 415-965-7130) has announced a 15M hard disk that can either be installed in the system unit or housed separately. $2,995.

Δ **CompuSoft Publishing** (1050E Pioneer Way, El Cajon, CA 92020; 714-588-0996) is the publisher of David A. Lien's *Learning IBM Basic*, a paperbound instruction manual suitable for beginners. $19.95.

Δ **Digital Marketing** (2670 Cherry Lane, Walnut Creek, CA 94596; 415-938-2880) has announced the availability of the *Micro Link* communication program for the Personal Computer. *Micro Link* allows keyboard conversations, electronic mail, and the exchange of

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files, including text, spreadsheet, and program files. Requires asynchronous card. $89.

Δ **Infopro** (Box 22, Bensalem, PA 19020; 215-750-1023) publishes *The Directory of Independent IBM Personal Computer Hardware and Software*, which includes more than 400 evaluations of pc-related products. $29.95.

Δ From **Statistical Computing Consultants** (9025 Andromeda Drive, Burke, VA 22015; 703-455-2379) comes *Survtab*, a program designed to assist in entering, editing, and analyzing data from survey forms. *Survtab* can handle up to eighty items per questionnaire. $180.

Δ **Smith Educational Engineering Services** (Box 244, Arlington Heights, IL 60006; 312-394-3513) has released the communications package *Icomm*, intended for either a modem or cable connection. It supports two communications adapters, directory or printout while on-line, full or half-duplex selection, hexadecimal display, and nine user-programmable keys. Requires eighty-column display. $100.

Δ **Sybex** (2344 Sixth Street, Berkeley, CA 94710; 415-848-8233) has published *Celestial Basic*, a book on programming for astronomy enthusiasts. Using the programs in this book, you can observe the changes of the heavens without leaving your living room. $13.95.

Δ **Amdek** (2201 Lively Boulevard, Elk Grove Village, IL 60007; 312-364-1180) has introduced an amber-screen monitor with 900-line resolution. $230.

Δ **Professional Software Associates** (Box 41277, Minneapolis, MN 55447; 612-929-7889) has released a number of programs for the Personal Computer: *Professional Financial Planner/Asset Manager*, a package designed for professionals that allows them to give their attention to hundreds of clients. The system includes database, financial needs analysis, investment performance tracking, tax planning, and other features. Requires 320K disk system and parallel printer. 128K RAM recommended. $1,500. Δ *ICE, Intelligent Communications and Editor*, a dumb terminal emulation with a built-in editor. Requires asynchronous adapter and modem. $89.95. Δ *Mail List Pro*, a mail list management system that can retrieve a record in about two seconds. Requires two disk drives or hard disk and a parallel printer. $49.95. Δ *Basic Programming Utilities*, a series of four programs: *Pac*, which removes all comments and useless space from a program; *Lister*, which produces a formatted listing of any Basic program, improving legibility; *Cross Ref*, which generates a listing of program variables, line transfers, and keywords; and *Encrypter*, which allows files to be protected by elaborate passwords. *Lister* and *Cross Ref* are $39.95 each; *Pac* and *Encrypter* $49.95 each; all four $99.95.

Δ **Computer Software Technology** (9818 West Belleview Avenue, Box 5049, Littleton, CO 80123; 303-794-0858) produces *Word/PC*, a page-oriented word processor with powerful formatting features. It is designed to take advantage of a variety of special printer features and can produce letterheads as well as text. The Basic version of the program requires 64K memory. The compiled version, on the same disk, requires 96K. $89.95.

Δ **Aardvark Software** (783 North Water Street, Milwaukee, WI 53202; 414-289-9988) has two programs designed for professional tax planning: *Professional Tax Plan*, for income taxes; and *Estate Tax Plan*, for inheritance taxes. Both require two disk drives and a printer. *Professional Tax Plan* $350; *Estate Tax Plan* $545.

Δ **Digital Systems** (680 Lafayette Road, Hampton, NH 03842; 603-926-8737) offers *PhoneSaver*, a database program designed to sort phone bills and report unauthorized calls. $95.

Δ New from **PCsoftware** (4155 Cleveland Avenue, San Diego, CA 92103; 714-279-2482): *Creatabase*, which can implement a database with up to sixteen fields and print lists, labels, and forms. Two drives and monochrome monitor recommended. $59.50. Δ *PCcrayon*, a graphics program you can use to create pictures from the keyboard and save them to disk. Color/graphics adapter required and RGB monitor recommended. $44.95.

Δ **Davell Custom Software** (Box 4162, Cleveland, TN 37311; 615-336-3055) has announced *Pairstat*, a statistics package that can analyze, plot, and curve fit up to 1,000 pairs of variables. Requires an eighty-column screen and an IBM or Epson printer. $150.

Δ **TCS Software** (3209 Fondren Road, Houston, TX 77063; 713-977-7505) has rewritten its Big Four accounting package around a database. The new system, which runs on the Xedex Baby Blue board, is dubbed the *TCS Client Ledger System*. Call your dealer for prices.

Δ **Quadrum** (4357 Park Drive, Norcross, GA 30093; 404-923-6666) sells a combination board that can include up to 256K RAM, an RS232 port, a Centronics parallel printer port, and a real-time clock-calendar. The board comes with a one-year warranty. Prices range from $595 to $995.

Δ **HowardSoft** (8008 Girard Avenue, Suite 310, La Jolla, CA 92037; 714-454-0121) has announced an IBM version of its *Real Estate Analyzer*. The program is designed for investors who wish to do projections of investment risk and return. The IBM version is updated and includes the latest changes to the tax laws. $250.

Δ **The Hayden Book Company** (50 Essex Street, Rochelle Park, NJ 07662; 201-843-0550) has published *Basic Programs for Business, Volume 2*, which includes over seventy complete business programs that are fully documented and can be modified to individual needs. $13.95.

Δ **Intellect Associates Inc.** (Box 365, Holbrook, NY 11741) has announced *C88*, a software development package for the C language. *C88* includes a one-pass compiler, a linkage editor, and a library of functions. Requires two disk drives. $250. Δ Also from IAI: *Data Management System*, a menu-driven database program that lets you create your own forms for data entry and printing. Files are in standard, transferable ASCII form. 48K and monochrome adapter required. Two disk drives recommended. $150. Δ *Window*, a full-screen text editor specially adapted for the IBM which employs standard ASCII files. Requires monochrome display. $150. Δ *PCText*, a program that can be used with a text editor to produce

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Δ **Vector Electronic Company** (12460 Gladstone Avenue, Sylmar, CA 91342; 213-365-9661) produces an extender card for troubleshooting and testing. $22.35.

Δ **Beaman Porter** (Pleasant Ridge Road, Harrison, NY 10528; 914-967-3504) has released Version 1.8 of its word processor, *PowerText*. The new version includes a tutorial and an automatic outline feature. $399; $199 if you already have the p-System.

Δ **Visionary Electronics** (141 Parker Avenue, San Francisco, CA 94118; 415-751-8811) manufactures a modem that can answer the phone and record a message in your absence. Includes a real-time clock and calendar. $595.

Δ **Software 1040** (10 Nevada Drive, Box 1010, New Hyde Park, NY 11042; 516-775-5566) offers *Plan 1040*, an up-to-date tax planning program. Printer recommended. $150.

Δ **Datamac** (680 Almanor Avenue, Sunnyvale, CA 94086; 408-735-0323) has a new combination board. It can hold up to 256K RAM and two asynchronous communications controllers. Prices range from $550 to $1,239.

Δ **Starware** (1701 K Street N.W., Suite 801, Washington, DC 20006; 202-466-7351) publishes the *Buyer's Guide for the IBM Personal Computer*. A new edition is mailed every six weeks. Subscription $8; single copy $1. Δ Also from Starware: *The Draftsman*, a graphics program intended to produce charts and graphs. Color/graphics adapter and two disk drives required. 128K memory recommended. $200.

Δ **SuperSoft** (Box 1628, Champaign, IL 61820; 217-359-2112) has released *Scratchpad*, a spreadsheet that uses disk drives as adjuncts to system memory, eliminating "out of memory" errors. Requires two drives. $295. Δ Coming in January: a compiler for Ada, the official Department of Defense language. $300.

Δ **The Avalon Hill Game Company** (4517 Harford Road, Baltimore, MD 21214; 301-254-5300) has translated a number of games for the Personal Computer. Titles include *Midway Campaign* ($21), a historical military simulation; *Galaxy* ($25), a multiplayer science-fiction strategy game; *Voyager* ($25), a graphics adventure inside a robot-controlled space ship; and *Draw Poker* ($21), which allows you to compete against a number of computer opponents. All require 48K.

Δ **Sofstar** (13935 U.S. 1, Juno Square, Juno Beach, FL 33408; 305-627-5511) offers *VisiCalc* real estate templates designed for businessmen. The templates can be used to calculate amortization and depreciation, report rates of return, or generate a personal finance statement, among other things. $119.95.

Δ **Starside Engineering** (Box 18306, Rochester, NY 14618; 716-461-1027) has announced *InterLync*, a terminal emulation that can operate at baud rates up to 9,600. There is also an optional PROM available that redefines certain graphics characters as APL characters. Requires 128K and an asynchronous port. $100; $175 with APL option.

Δ **The Microperipheral Corporation** (2643 151st Place N.E., Redmond, WA 98052; 206-881-7544) offers a modem with an autodial feature and an additional RS-232 port. $350. Δ Also, an autoanswer modem that can decode touch tone telephone codes into their ASCII equivalents. $500.

Δ The Hercules Graphics Card is designed to drive the standard monochrome display and printer with graphics. From **Hercules Computer Technology** (160 Beechnut Drive, Hercules, CA 94547; 415-799-9354). $599.

Δ **Kraft Systems** (450 West California, Vista, CA 92083; 714-724-7146) offers a joystock with a limited one-year warranty. $69.95. Δ Also: a pair of game paddles with limited warranty. $49.95.

Δ **Aeon Concepts** (1657 Red Mill, Pittsburgh, PA 15241; 412-831-5352) produces the strategy game *Microcosm*, which simulates the growth and evolution of microorganisms. It can be played in competition, with the players controlling rival colonies of germs. $39.95.

Δ **Universal Data Systems** (5000 Bradford Drive, Huntsville, AL 35805; 205-837-8100) has announced the release of a high-speed modem with a four-step, built-in test function. $2,650.

Δ **Wildfire Publishing** (Box 420, Carpinteria, CA 93013; 805-967-8444) sells *Your Fortune in the Microcomputer Business*, a package of two books with business tips. $24.95.

Δ **DataMost** (9748 Cozycroft Avenue, Chatsworth, CA 91311; 213-709-1202) has released the fast-moving arcade game *Space Strike*. Requires color/graphics adapter. $29.95.

Δ **Flagstaff Engineering** (2820 West Darleen, Flagstaff, AZ 86001; 602-774-3588) offers an eight-inch disk drive with a five-foot attachment cable. $1,295. Δ Also available: a sixty-four-point digital output and input card for data acquisition and control. $395.

Δ **Image Processing Systems** (Box 5016, 6409 Appalachian Way, Madison, WI 53705; 608-233-5033) is the manufacturer of *ProofWriter*, a word processor with full-screen editor and spelling checker. Requires 128K and two disk drives. $180.

Δ **Business Information Technologies** (Box 619, Milpitas, CA 95035; 408-262-1054) has a *Forms Designer* to help programmers create formats for data entry. Requires 128K and monochrome display. Two drives recommended. $175.

Δ **Sirius Software** (10364 Rockingham Drive, Sacramento, CA 95827; 916-366-1195) has announced *Call to Arms*, a strategy game for two to four players featuring maps of Europe in 1942 or Scotland in 1750. Requires color/graphics adapter. $29.95.

Δ **Applied Software Technology** (14125 Capri Drive, Los Gatos, CA 95030; 408-370-2662) sells *VersaForm*, a business form processor. It functions as a database suitable for processing billings, personnel records, insurance claims, and other forms. Requires 128K and two double-sided drives. $389.

Δ **Micro Decision Systems** (Box 1392, Pittsburgh, PA 15219; 412-276-2387) has released *DocuCalc*, a program that prints documentation on *VisiCalc* models. $95. ▲

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PC Brings Alarm to Madison

by Jonathan Miller

Fire officials in Madison, Wisconsin, were understandably flattered. A team of investigators from the National Aeronautics and Space Administration wanted Madison's input on ways to improve fire ground communications. NASA, a leading innovator in the development of firefighting paraphernalia, had been talking with the big boys in New York, Los Angeles, Boston, and Chicago. Now they were in Madison in the shadow of the ornate state capitol crowned by "Miss Forward."

If fire officials in Madison felt flattered, they had reason. The fire department boasts a talk-around radio frequency system that permits two-way communication among responding units at the scene. The system is part of a communications network that has helped the 287-person department chalk up an average response time of less than five minutes.

Quest for Fire. All this was impressive but wasn't the reason for NASA's visit. The city named after our fourth president is developing a unique computer-aided fire alarm system (CAFAS) using an IBM Personal Computer. That system, scheduled to go on-line this month, will instantaneously give dispatchers in this city of 160,000 the complete book on a hundred locations protected by radio-alarm boxes. CRT and printer readouts will list critical information on everything from the names of the nearest cross streets to hydrant

locations to building construction.

"It'll benefit district fire chiefs and people in the field enormously," predicts Richard Means, director of communications for the Madison Fire Department. "Just knowing the location of building key-boxes alone is going to help save that $500 plate glass window. Now, if responding units have a question about hazardous materials, we'll have the information right at our fingertips."

Before CAFAS, dispatchers had to let their fingers do some walking. As soon as they read the alarm box number off a Nixie tube (an LED precursor), they'd swing over to a cabinet to pull a file card on the location. It was a system, but there were times when, as Means recalls, it seemed to be running too much "by guess and by golly."

Information was not standardized and was often sketchy. The system worked, just as did the bucket brigades and fire wardens of an earlier time, but it could work better, had to work better, for an undermanned department in a petrochemical age.

Enter Bryce Parsons, supervisor of communications/electrical for the Madison Department of Transportation, and his able assistant Bruce LaVigne, a University of Wisconsin undergraduate majoring in computer sciences. Parsons had hired LaVigne to learn the ropes of a radio installation. The work was interesting enough, but not much challenge for someone who had decided, after detours into pre-med and electrical engineering, that he preferred to "get down and grimy" with the details of hardware and program design.

"I don't think there's a piece of equipment I own—whether it be a stereo or a calculator—that I haven't taken apart a couple or three times," says LaVigne. "That's why I was attracted to electrical engineering. The more I got involved in writing programs and tinkering around and getting the computer to do what I wanted it to do rather than what it wanted to do, the more I enjoyed it."

Burning Up the Airwaves. LaVigne heard that Parsons was considering purchase of a commercial microprocessor control console to computerize the department's radio fire-alarm signals. What Parsons had in mind was a good system, but with its $34,000 price tag and limited display and memory capacities, it didn't really fit the Fire Department's specifications for a comprehensive overhaul.

The department wanted vital and historical data on each box to fill an eighty-column screen. They also wanted the new system to report the location of the alarm box and its battery condition; the height, construction, and type of occupancy of the buildings involved; the nearest engine companies; the primary and secondary hydrants and water flow; the presence of hazardous materials; and the locations of gas meters and electrical panels. This kind of project required custom tailoring, and LaVigne volunteered to hand-tool the pattern.

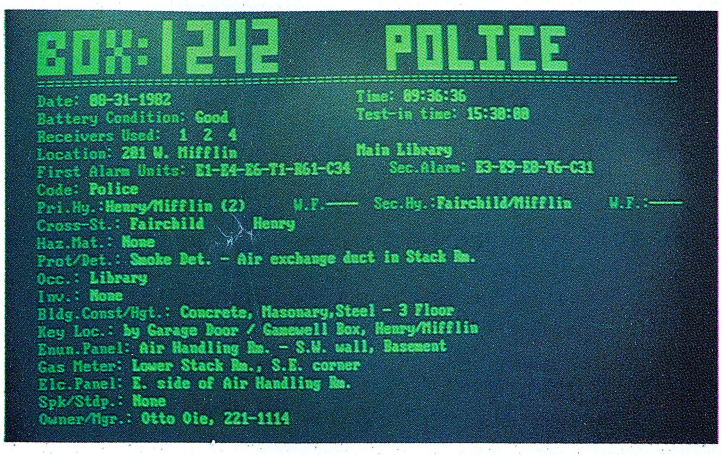
Fire codes require redundancy in dispatch systems, so the CAFAS specs called for three microcomputers—two on-line at all times and a third as backup. The two on-line computers would, in turn, be linked to a Sola battery backup unit to ensure a six-hour emergency power supply in the event of a power outage or a generator failure.

Since the fire department wanted instant access to a whole screen of information for each box, memory capacity was crucial. All that data had to be storable in memory; precious seconds might be lost going to disk.

"My original estimates of how much memory we needed went up quite a bit," LaVigne confides, "mostly because the fire department kept saying it'd be nice if we had this, nice if we could have that. All it really cost us was a little more memory. We just bought more chips and plugged them in."

After plugging away, LaVigne concluded he needed 320K, a capacity that effectively eliminated Apple from consideration. "We looked at Apple, among others, but without memory mapping and page flipping, you can only get 64K on an Apple. This pc system, with its Datamac board, has five times that and is capable of going up to a megabyte."

Other hardware on the system includes two single-sided disk drives, a monochrome board, and a Lab Tender from Tecmar. The last features three parallel eight-bit I/O ports. Two of the input ports are reserved for a specially designed key pad used by dispatchers to access the system for maintenance-check data on the battery-operated alarms; the third is reserved for four radio receivers.



The Madison alarm system displays the box number and type of alarm and fills the monochrome screen with pertinent information.

The Fire Down Below. Radio alarms were introduced in Madison about fifteen years ago. With buttons for fire, ambulance, and police, and connections for building smoke, sprinkler, and intrusion detectors, the alarms did more than the old corner fire alarm. The city's aging system of spring-wound Gamewell boxes was difficult to maintain. Their miles of underground cabling could be shorted out in heavy storms, which raised the levels of Madison's surrounding lakes, Mendota and Minona. Even worse, the Gamewells had become more a menace than a protection. "For every fifty boxes pulled," says Means, "forty-eight are false. It's that high a ratio."

Radio boxes have tended to escape malicious tampering. Their placement in the city has something to do with that; neighborhood radio alarms are generally found in the outlying areas, while master radio alarms are usually installed in large buildings where security is tighter. The necessity to break a protective glass to reach the buttons also discourages mischief—although not always. "One radio box near the university has had the most action," says Means, who vows to make that box number one on his hit list.

For every action there's a reaction, and for every solution a new set of problems. Unlike wired Gamewell boxes, radio alarms are not susceptible to the seasonal ups and downs of lakes Mendota and Minona. But atmospherics, signal variations, and line surges can bedevil the most earnest of electrical engineers—especially those who are twenty-two and stepping out into the brave new world of programming.

Blazing Logic. The alarms broadcast a nonstandard binary-coded decimal signal, much like an analog signal, according to Keith Lippert, the communications technician who worked closely with LaVigne. That's another way of saying the signal had to be converted into positive logic to be fed to the pc. What looked relatively easy, however, proved a little tougher than the specs suggested, thanks to some faulty assumptions regarding the number of milliseconds between bits in the alarm signal. It took the co-workers three weeks to puzzle that out and replace the program's time constant.

"I kept thinking that my routines weren't working properly," LaVigne recalls, "that somehow I had a bug in my programs. Finally, Keith and I sat down and went through the signal using a signa-

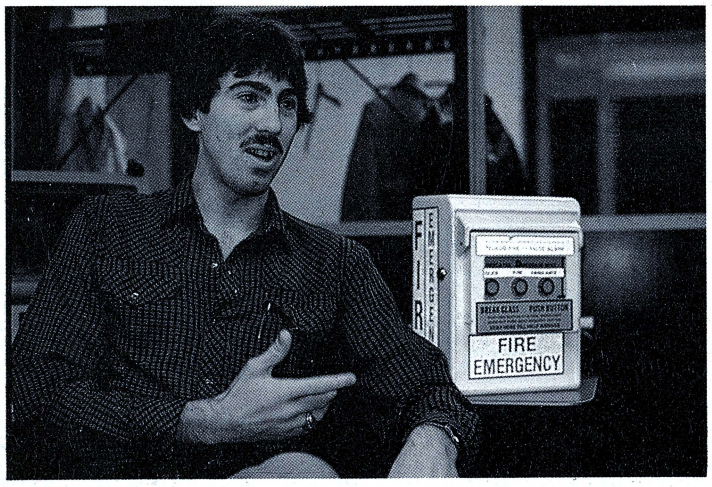
ture analyzer, which basically we used like a storage scope to track down how long each part of the signal took. We found out that one part of the signal that should have taken four milliseconds was actually taking thirty."

The system is designed to decode signals from four receivers—two at the fire station and two microwave remotes located on the east and west sides of the city. Radio frequency interference and a passing airplane have occasionally fouled up signal reception. The redundant features of the microwaves would presumably go a long way toward eliminating that system glitch, but there was a problem: a 700 microsecond gap between the times when the microwave and standard radio frequency signals arrived at the fire station. The modulated microwave signal had to be converted back to a voltage signal before it could be processed by the pc, and there was a lag.

"The circuitry does nothing more than convert the signal, which comes in serially, from BCD into plus five volts in ground," LaVigne explains. "I decided against putting in a delay line in hardware. I figured it would be easier and much more tolerable if I were to do it in software, because then it would accept anything between zero and seven hundred microseconds. I put in a delay loop by writing an interrupt routine generated from one of the timings on the Tecmar board, and it provides enough time to let the other signal in. If I'd gone with the hardware, I would have had to adjust it to come out exact every time, and that would have been hard to do."

Flaming Printouts. Each radio alarm tests in at a designated time each day. Under the old system, a dispatcher read the box number off the Nixie tube and recorded the information on a form. Under LaVigne's, the pc will provide an Epson MX80 printout three times a day—at 7:30 a.m., 11:00 a.m., and 2:30 p.m.—listing any box that has a weak battery or that failed to test in during the preceding period.

Dispatchers will retrieve information from disk, using a sixteen-key key pad from Keytronics. The pad sports ten numerical keys and six function keys for, among other things, time, date, box number, and alarm acknowledgement.



At the other end of the alarm link: a radio box with separate buttons for fire, police, and ambulance; and programmer Bruce LaVigne.

LaVigne and Parsons had several reasons for choosing an abbreviated key pad. Simplicity was one; computers are new to the Fire Department. Another, says LaVigne, was to prevent accidental reinitialization of the program. Lastly, there was that other human factor—play. In the wee hours of the morning, a dispatcher tempted by a full IBM keyboard might find other ways to engage his pc.

With the system up and running, the agenda now includes a modification of the character set, from blocky to rounded for enhanced readability. "I have the new characters already defined and I have the chips to change them," says LaVigne. "The Epson graphics codes that are above 128 are different from the codes that IBM uses, so what you see won't be what you get. It's going to come out looking really weird. I'll be using the PROM board we have to modify the character set."

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Fighting fires, to borrow a phrase, ain't what it used to be.

Alarming History. Back in 1835, for example, when the Big Apple was a mere wisp of a megalopolis with 250,000 souls (and Jobs's and Wozniak's little Apple an undreamed-of miracle), Wall Street suffered its worst day ever. It was virtually destroyed by the Great Fire of New York on a wind-swept, subzero evening nine days before Christmas.

Fire communication in Jacksonian America was quite primitive. The original alarm that night in December was sounded by a night patrolman, hired by a fire insurance company, who spotted the telltale glow in a five-story commercial building. His shouts were heard by watchmen in lookout towers, who relayed the alarm to a guard in City Hall, who immediately tolled the City Hall bell. Suddenly, the sleeping city was aroused by the sound of church bells beating out a signal in clangs and pauses that volunteer firemen identified as the signal of the first ward.

Donning their red shirts and dark blue trousers, the volunteers grabbed coats and leather helmets and hurried to the fire station. There they formed two lines in front of their hand-drawn and hand-operated pumping carts, while foremen trumpeted commands through brass megaphones. With a torch-bearing youth at the point, they strained as one, pulling their heavy engine through snow-clogged streets. Spirited competition among volunteer companies sometimes seemed to rival the blaze, their pride prodded by insurance company rewards to the first unit reaching the scene.

Competition became so intense that companies resorted to trickery, running zigzag courses through streets to prevent others from passing. To a volunteer, the only disgrace worse than being passed en route was being outpumped at the scene when rigs and hose lines were linked to reach a distant blaze. Fist fights sometimes broke out as companies competed for hydrants.

Minus seventeen degree temperatures undoubtedly took the fight out of volunteers the night Wall Street burned. By the time the first unit arrived, ten minutes after the first alarm, the commercial building was ablaze. A powerful gale was fanning the flames, and hydrants were frozen. The nearest water source was the East River, three blocks away and itself choked with ice. In the best of conditions, a fire company might pump a stream 180 feet, but this night mean winds whipped and flayed the jets of water, coating firefighters with ice. They were using a water pistol on a holocaust. By noon the next day, seventeen city blocks lay in ruins, with the cause of the fire unknown.

Fire and Tweed. Firefighting, it is said, has followed the growth of American cities. It hasn't always followed the growth of technology. In New York, for example, volunteer firefighters became a powerful political force and a bulwark in the Tammany Hall political machine of Boss Tweed. They resisted the introduction of the steam-powered pumper, which required less manpower, and effectively blocked the formation of a paid fire department until 1865.

Cincinnati, the first city to buy a steamer, also became, in the 1850s, the first to professionalize. Paid firemen, however, weren't too crazy at first about sharing their station lodging with the smelly black and grey Percheron circus horses used to pull the hefty engines. Eventually, though, the horses became pets, soon to be joined by the fleet-footed and spotted Dalmatians, who were trained to run ahead of the engines and bark warnings to pedestrians.

Sixty years ago, according to Dick Means, the corner spring-wound fire box was a department's primary alarm system. Ma Bell, however, sent it the way of the high-buttoned shoe. Although master radio alarms play a major role in protecting large buildings, most fires today are reported by phone. Alarms, per se, are no longer counted in a city's fire ratings, according to Means. Moreover, of twelve thousand emergency calls logged in by the Madison Fire Department in 1981, eight thousand were for ambulances, twice as many as for fires.

Madison took the lead in Wisconsin some eighteen years ago by becoming the first city to institute a paramedic program under Fire Department auspices. They did it by pulling eight firefighters off their rigs. Those people were never replaced, according to Means, and now, with a shortage of overtime funds, the department has had to reduce its engine crews from four firefighters to three—or three under the standard recommended by the National Fire Protection Association.

Shortages and personnel shuffling have also transformed the old fire station. It's rare for firefighters to be assigned to the same station (the city has ten) on a continuing basis. "It's just not that way any more," says Means. "Every day of the week, they're scattered all over, switching because of vacations or sickness." As a consequence, a firefighter has to have a working knowledge of the entire city, which, adds Means, is impossible. "You have fellas driving pumpers out of a station where they don't normally work and not knowing the exact location of hydrants."

Which is why CAFAS—and a projected computer-aided dispatch system linked to Madison's Burroughs mainframe—looms large in the thinking of Means and Fire Chief Edward Durkin. When you're short-staffed and fighting complex fires in multistory buildings bursting with potentially toxic flammables, communications can spell the difference between life and death. With LaVigne's readouts, dispatchers now can radio trucks en route about primary and secondary hydrants, building materials, and whatever, so precious time isn't wasted guessing which of the four major classes of fire they're likely to be dealing with.

Burning Bright. How much of a difference will CAFAS make? It will do more for less, and that always counts. It will spare dispatchers the trouble of getting up and flipping through a card file. And it will give them a full screen of information on each box to relay to the responding units, not to mention streamlining checks on radio boxes. "If it saves one life in ten years," declares Means, "it's paid for itself." ▲

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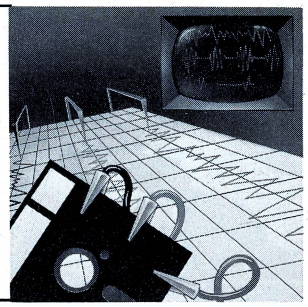

Unless otherwise indicated, software reviewed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

Proofreader and **Grammatik.** By Dr. Bruce Wampler. These are a coordinated pair of programs designed to check and correct spelling and grammatical errors. The programs were tested with files generated by *WordStar*, *Textplus*, and *Edlin*. No problems of any kind were encountered. For *WordStar*, the programs were tested with the original source document and ASCII disk output files. Since *Proofreader* and *Grammatik* can be customized to recognize and ignore dot commands and embedded commands from various word processors, it is possible to deal with documents in either format. The programs deal with both file types easily. Thus there is no need to take extra steps or do anything unusual to make the programs compatible with this word processor.

The typical procedure is to write the document with your word processor and feed it to *Proofreader*. Each word is then checked against a 32,000 word Random House dictionary and also against any auxiliary dictionaries the user wishes to specify. These auxiliary dictionaries are useful for technical jargon from specialized fields as well as other words not contained in the Random House dictionary.

After checking the document *Proofreader* allows the options of correcting the file with an interactive editor, displaying unknown words on the screen, passing the file to *Grammatik*, or exiting the program. The interactive editor, called Proof-Edit, is the most interesting of these options.

Proof-Edit operates in any of three modes. You can correct the errors, have all the unknown words marked with a sharp sign (#) for later correction with your word processor, or enter a special "*WordStar* mode." In the *WordStar* mode, you correct errors interactively and all changes that would result in a change in line length are marked with a # so that the document may be easily rejustified.

You are allowed seven options when correcting the words. If you encounter a word that is correct but unknown to the dictionaries, you can accept it as is and instruct the program to ignore it for the rest of the document. You can accept the word but have the program continue to alert you to each subsequent occurrence. You can also accept the word and have it saved as an addition to the main dictionary or an auxiliary dictionary.

If you know that the word is spelled incorrectly and you know the correct spelling, you can simply correct it. If you don't know the correct spelling, you can type "d" and Proof-Edit will show you the correct spelling of about twenty words that are similar to the one in question. A useful feature of this routine is that you are allowed to enter the dictionary with a word other than the word in question. Thus, if you didn't know how to spell "prejudgment," it would be more efficient to enter the dictionary with "judgment" than "prejudgment." On-line help and program exit are the remaining options.

Use of the companion program, *Grammatik*, is the next step. *Grammatik* is a unique refinement that goes beyond correcting spelling errors. This program analyzes your language usage and alerts you to possible violations of accepted style, such as archaic usages (using *upon* instead of *on*), awkward usage (*and/or*), wordy phrases (*in addition to*), certain spelling errors that escape spelling checkers (*can not*), redundant phrases (*join together*), as well as many other categories. It can also check for sexist usage and user-defined categories of problems. Many punctuation errors are also detected, such as misuse of quotation symbols with other punctuation, inconsistent capitalization, and unbalanced parentheses, brackets, or quotes. Errors frequently made with word processors are picked up. Double punctuation (*??*), double words (*the the*), and sticky shift keys (*THe*) are among the most helpful. Use of this program can be a humbling experience.

When it has finished, *Proofreader* reports summary statistics including the number of problems detected, number of sentences and words, average sentence length, average word length, number of questions and imperatives, number of long and short sentences, number and location of the longest and shortest sentences and words, number of "to be's" and prepositions, and totals for user-defined categories. Many of these statistics have been used in studies that attempt to develop indexes of readability. Finally, you can send the document to *Profile*, a program that reports the frequency of occurrence of each word used.

There are some problems the program cannot detect. It will not pick up split infinitives, for example. It also picks up *rather* as a vague adverb, even when it is used properly as in the phrase *rather than*.

Two unadvertised bonuses are supplied with the package. *Lookup* is a program that makes the Random House dictionary available on-line independently of *Proofreader*. *Sortdict* is a fast sorting routine. Although its major use in the Aspen package is placing new dictionary entries in alphabetical order, it can be used as a general utility to sort almost any PC-DOS file that has one entry per line or uses # as a delimiter.

The documentation is concise, helpful, and well written. In day-to-day operation, however, the program options and prompts are so well thought out and implemented that the manual is almost superfluous.

The program can be made "smarter" with each use by the addition of words and phrases to the auxiliary dictionaries. By setting up "configuration" files you can customize the operation for special uses or preferences. These files work like procedure files on large mainframes or batch programs on the pc. They generate the desired sequence of events automatically.

If you look hard enough, you can find some things to criticize. Unlike the other programs in the package, *Profile* requires user intervention, which prevents automatic operation with configuration or batch files. If you get tired and attempt to correct a word without giving the *c* command, you get a peculiar glitch that makes part of your correction a part of the correction prompt.

In view of what these programs accomplish, however, these criticisms seem trivial. Serious writers will find these programs at least as useful as their favorite word processors. Given the current state of the art, it is hard to imagine how they could be improved in any significant way. bo

Proofreader and *Grammatik*, by Dr. Bruce Wampler, Aspen Software (Box 339, Tijeras, NM 87059; 505-281-1634). *Proofreader* $50; *Grammatik* $75.

Treasure Hunt. By Howard Arrington. There are ten valuable items scattered about a maze. Your object is to find them as quickly as you can. There are no monsters to fight, no thieves to make off with your hard-won loot, no fiendish puzzles to decipher. You even have a map that shows you the maze and your position in it.

The displays give a character-eye view of the maze in sharp color. (Color/graphics adapter required.) Treasures appear as yellow squares. When you pick up a treasure, it is added to your list and you are rewarded with a cheerful melody.

Single keystrokes guide your feet through the maze. Using the numeric key pad, you can call up a map with your footprints or without. You can also call up a partial map, rehide the treasures in the existing maze, or generate a new maze.

There is not much to be said for this trivial little game. On the other hand, there is not much to be said against it. The only defect is treasures are painted to the screen before the walls of the maze, so you get a brief glimpse of objects which should not be visible.

Treasure Hunt would make a good diversion for that six year old who wants to learn all about computers. fj

Treasure Hunt, by Howard Arrington, Ensign Software (2312 North Cole Road, Boise, ID 83704; 208-378-8086). $19.95.

Snooper Troops: The Granite Point Ghost. By Tom Snyder. When microcomputers began, the people who bought them were mostly programmers either by profession or by hobby. Naturally, many among them were science-fiction buffs, and certainly science followers. Early games tended to be set in space—or in medieval dungeons, the other fad of serious gamesters.

Now the microcomputer has spread to encompass all sorts of people; there is no one who cannot find good use for a computer. And the spread of the micro's popularity is testified to by a newcomer to the gaming field, the mark of popular appeal that spans all walks of life: the mystery.

The second major entry into the mystery field for micros comes from a brand-new company called Spinnaker, and—now, adult gamers, don't quit reading—it comes in the form of an educational game, *The Granite Point Ghost*. It is intended to be the first of a line of mystery games in which the solvers are called the Snooper Troops.

Although the Snooper Troops format is definitely educational and worthy of a place in every fourth-grade through eighth-grade classroom, it's also great fun. Guaranteed, parents who buy Snooper Troops for their kids will burn the midnight oil solving it after the kids are bedded down. And, unlike so many educational programs, the kids won't need encouraging to play it during the day.

Snooper Troops is a mystery in hi-res color. It takes place in the tiny town of Granite Point, Wherever, which you must map. As a member of the Snooper Troops, you get to drive around town in your Snoopmobile, getting statements from suspects, making phone calls (from booths) to informers or to the infamous Mr. X, and even snooping in—that is, searching—the suspects' homes when they're away.

The mystery is more structured than it would be for general adult use. Each suspect has three clues to give; each home yields three more clues when searched; and each phone contact (other than Mr. X) has three clues to give. In addition, there are special message clues you get at Snooper Troop headquarters through the computer Snoopnet; often you must hurry back to get them before they go off the air. And there are clues Mr. X will give you if you call him at the number he gives on the precise day he says. The clues are numbered, and you must keep track of each with its number.

Besides the general learning involved in deductive reasoning and organizing how to go about solving the mystery, several touches add to the educational value of Snooper Troops. To extract information from the phone contacts, you must suggest subjects to them; you're given three words for each suspect, but you may not use the exact word you've been given. You must give another word that hints to the informer what you're looking for. Only when you find the correct related word will you get the real clue. Other information and other clues help direct you to the correct word if you have trouble.

Searching the houses is a whole game in itself. The houses are assumed to be dark when you search them, and you have a flashlight. But if someone is home or arrives home and you use the flashlight, you'll be caught. When you enter the house, the screen shows the layout of the house only in walls; the locations of clues are shown by question marks. You must move to a question mark and take a picture with your Snoopmatic camera, then get out without being caught. The only harm in being caught is having to start that search over again—which means waiting again for the day of the week that suspect is apt to be out.

There are many homes in Granite Point but only eight house suspects. It is fun that you can search the other homes as well, if you like. Instead of finding evidence such as ticket stubs or important papers, you catch photos of such things as "a box of corn flakes and a bunch of bananas."

When you believe you know who is making all the mischief—haunting an old mansion to scare the new owners away—you can make an accusation. Then you'll find that you have to eliminate every other suspect by identifying the clue that exonerates each. Then you must name the means and motive of the guilty party. No cinch, but educationally thorough and thoroughly fun.

Incidentally, drive carefully. If you don't, you and the Snoopmobile may end up spending time in the tow yard.

Snooper Troops is a breakthrough in educational programming: it is enjoyable, colorful, of trade quality, and an excellent educational tool.

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It's a good mystery, too. mct

Snooper Troops: The Granite Point Ghost, by Tom Snyder, Computer Learning Connection, Spinnaker Software (215 First Street, Cambridge, MA 02142; 617-868-4700). $44.95.

Textplus. This is an integrated set of programs written in Basic and designed to do both word processing and database management. Applications suggested by Owl Software include mailing labels, personalized mass mailings, report generation, telephone lists, and general "data files" for "card file" applications. Its main advantage is that it is a system. In other words, the database management functions are coordinated with the word processing functions, and the likelihood of incompatibilities among programs is reduced. It is also possible to reduce the cost of the package by taking advantage of economies in marketing and design.

When evaluated as a word processor, *Textplus* contains a screen oriented editor as advertised. The great advantage of screen oriented editors is, "What you see is what you get." Word processors implement this principle to varying degrees. *Textplus* does this less than most. The program does include word-wrap so that you can see which words will appear on which lines, and there is no need to type carriage returns other than to indicate paragraph breaks. However, there is no on-screen justification. You cannot see justified text until the document is printed. Likewise, you cannot see centered phrases or underlining while editing.

Many functions are accomplished with embedded commands. These commands deserve special mention because they defeat the purpose of a screen oriented editor. Some word processors use dot commands or embedded commands to set parameters that will stay in effect through most if not all of the document. *Textplus*, however, uses these commands for functions that may be invoked frequently in a document. For example, to generate the output:

Kaapke, R. Boards and Buses. Softalk, 1982, 1, pp. 56-57.

requires that you type:

Kaapke, R. Boards and Buses.
ul=Softalk,
1982,
ul=1,
pp. 56-57.

After all this, you still could not duplicate the output because it is impossible to defeat underlining under the commas without leaving a space between each word and the following comma. Thus, if you had a list of references to type in a manuscript it is likely that you would beat a hasty retreat to your typewriter.

This lack of elegance in implementation makes the *Textplus* word processor difficult to use for applications like manuscripts, scripts, and text oriented reports. Since most commands are limited to 79 character blocks of text, the problems are compounded. Many commercial applications like mass mailings and business letters are less demanding, however. These documents rarely require "enhancements" like underlining, centering, subscripting, superscripting, and justification. If your word processing needs do not extend beyond these limits, *Textplus* does a reasonably good job. This might be the word processor of choice if you don't have to use the program yourself and can pay a secretary to do the work.

Additional problems are produced by the rigid 79 character limitation. The program's find and replace operation does not automatically invoke the word-wrap feature. This means you cannot replace a string with a longer one if the change would push the line length beyond 79 characters. *Textplus* warns you that it can't perform the operation.

Programs written in Basic and then saved in ASCII format can be edited with *Textplus*. Here again, there are problems imposed by the 79 character limit. If any of the Basic lines are longer than 79 characters, they will be truncated on the screen display. Attempts to modify and then save these lines will have unpredictable results.

Since editing operations take place within the memory space allowed by Basic, the maximum file size is 400 records in a 64K system and 1,000 records in a system larger than 64K. This means that the maximum document size for *Textplus* is about 13 pages or about 33 pages of typed text depending on the size of your system. The same limitations apply to "data files." They are also limited to 400 or 1,000 records.

An on-line inquiry system is provided that allows one to find any text string in any file on the disk with a single command (*filespec,string*). This is a fast and handy utility. Once the string is found, the record is printed on the screen as it exists in the file without additional formatting. Other database operations generally work well, but slowly.

The on-line inquiry system does not permit cross-referencing. It is necessary to sort the file and produce a report to do this. The other report-generating features include the production of histograms and tabular reports. Tabular reports are limited to the production of totals, averages, and percentages. More complex indices are difficult, if not impossible, for *Textplus*.

Record management is limited in scope. Records may be viewed or changed with the update utility, but they cannot be removed in this way. It is necessary to bring the file into the general editor to delete records and then resave the file. While new fields may be defined, they can only be added to the end of records. Rearranging fields is an unnecessarily cumbersome procedure.

A telephone number to call for technical information is prominently displayed throughout the manual and all documentation. There is no additional charge for the consultation. An attempt to use the service produced prompt, courteous, useful, and accurate information. It even produced an unsolicited return phone call when some additional applications and techniques occurred to the con-

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sultant. This kind of dedication is all too rare, and Owl Software deserves a great deal of credit in this area.

To sum it up, *Textplus* does many things and the concept of an integrated system of programs is an attractive one. Each of the things *Textplus* does is subject to serious limitations not necessarily present in other available programs dedicated to the specific tasks. The alternatives would probably cost more than *Textplus*, and the potential purchaser must balance power, flexibility, and ease of use against cost. bo

Textplus, Owl Software (1605 East Charleston Boulevard, Las Vegas, NV 89104; 213-982-6243). $200.

Stocks & Bonds. This program is modeled closely after a board game that first appeared in the sixties. In those far-off days before the Arab oil embargo, the stock market was a great place to make money. Interest rates were low. Bond prices were stable. Speculators were buying into uranium companies and real estate trusts, while their more conservative colleagues put the "smart money" on companies like Ford and 3M. The gloomiest investors stuck to "sure things" like Penn Central stock or New York City bonds. Stocks kept splitting. It looked like the economy had nowhere to go but up and up. Those days may come again. Indeed, someone playing this game will get the impression they already have.

A *Stocks & Bonds* game comprises ten turns, each representing one year. Obviously, this is slanted towards long-term investment. Each turn starts with a display and melody announcing a "bear market" or "bull market." Surprisingly, stocks sometimes rise across the board in a "bear market" and fall in a "bull market." There follows a news item, like "President confined in sanitarium for indefinite period. Tri-City Transport −5." Stock prices are displayed. Players (up to six) have the opportunity to buy and sell.

There are nine stocks available. You can also buy "Central City Municipal Bonds," which yield 5 percent and never vary in price. Each stock yields a certain percentage in dividends and comes with a brief description. In retrospect, some of these seem pathetic: "United Auto Company. Yield 2 percent. A medium large company in the large, oligopolistic automobile industry. United Auto, like others in the industry, is subject to whims of public fancy. Stock in this company represents a somewhat speculative investment with a good growth pattern. Because it is popular with the investing public, it has a fairly high price-to-earnings ratio and low yield." As the game progresses, you can consult automatically generated bar graphs to see how United Auto and the other stocks have done.

That's about all. The publisher aimed for a simple, Basic implementation of an existing board game. He did not overshoot the mark. Players have no access to information like book value or capitalization. They cannot buy stocks on the margin or trade in options. News items have no long-term effect on stock prices. Inflation is banished. Brokers do not take their fees, nor Uncle Sam his share.

The worst feature of *Stocks & Bonds* is the display—yellow on high-intensity white. And it flickers. This problem makes the game worthless for use with a color monitor, unless you want to alter the color yourself. However, the display is fine in black and white.

Overall, *Stocks & Bonds* would be a fine game for youngsters, or even a useful introduction for novice investors. fj

Stocks & Bonds, by Think Small, The Avalon Hill Game Co. (4517 Harford Road, Baltimore, MD 21214; 301-254-5300). $25. ▲

PC-DOS versus CP/M-86

A Comparative Review

by Ray Duncan

When IBM introduced their Personal Computer, they also announced that it would support no less than three operating systems: Microsoft's PC-DOS, Digital Research's CP/M-86, and the UCSD p-System. The release of the latter two packages, however, was delayed for some time, with the result that PC-DOS became by far the most widely used system on the pc. Now that all three operating systems are available, the owner of a new pc has a decision to make.

This article will try to facilitate that decision by comparing PC-DOS with CP/M-86.

What an Operating System Does. The operating system manages a computer's resources and provides a uniform interface between application programs and the physical devices attached to the central processor. For example, a software publisher with a general ledger program doesn't need to produce separate versions for users with single-sided floppy disks, double-sided disks, and hard disks; the same program will work on each, because the ledger program, when it wants access to a file, simply makes requests to the operating system in a standardized manner.

The operating system takes care of translating these calls into device-dependent operations and does the bookkeeping for each type of storage medium. In addition to file management, the operating system performs other essential services, such as finding and loading programs, controlling the printer and system console, and maintaining the time of day.

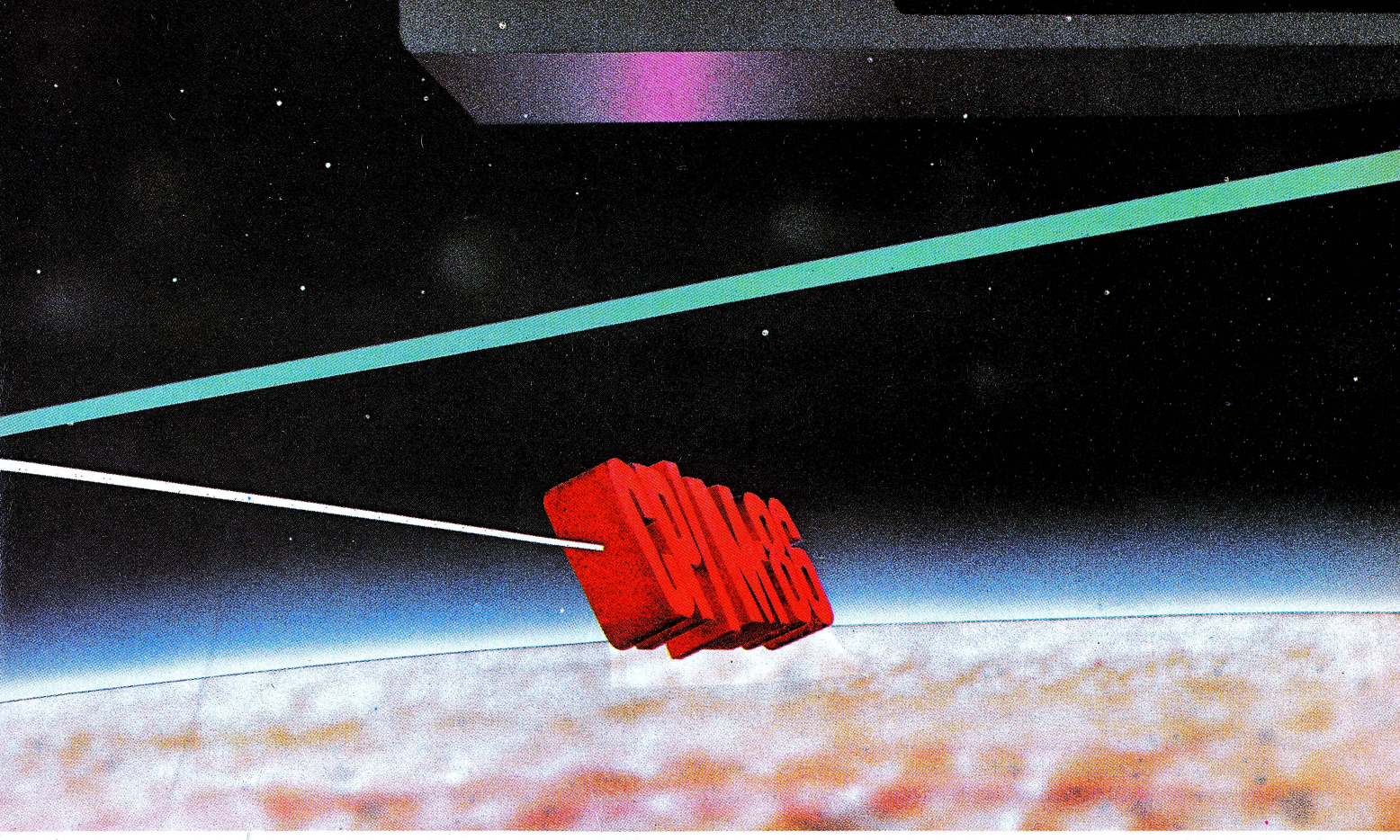
Genealogy and Anatomy. Both PC-DOS and CP/M-86 are descendants of the widely used CP/M-80 by Digital Research. PC-DOS was adapted from 86-DOS, a proprietary operating system originally sold by Seattle Computer Products for its line of 8086 S-100 bus microcomputers. The designers of 86-DOS made it mimic CP/M-80 in style of operation, so that existing 8080/Z-80 programs could be converted easily. For various reasons, however, they adopted a disk storage scheme completely different from that of CP/M-80.

When Digital Research released CP/M-86, they likewise made its basic services closely resemble those of CP/M-80, so that users and programs could make the transition with a minimum of pain. In fact, nearly all the built-in commands of the two CP/Ms are identical. Digital Research also chose to retain the exact same disk storage structure of CP/M-80 so that files could be moved between 8080, Z-80, and 8086/88 systems without modification. This decision had many ramifications, as we shall see.

Both CP/M-86 and PC-DOS are built up of three major modules or layers, each of which is commonly known by an acronym. The most primitive part is usually called the basic I/O system (BIOS). Coded in assembly language, it consists of a collection of relatively short routines that perform data transfers between the central processor and the peripheral devices (such as the floppy disk and keyboard). The next level is the disk operating system proper (BDOS, for basic disk operating system), which services application programs with such higher-level functions as opening a file and reading a record. The highest level of the operating system is the console command processor (CCP), which performs some of the common commands and contains the logic necessary to find and run user programs.

Commands and Utilities. From the point of view of the casual pc user, PC-DOS and CP/M-86 appear very much alike. There are commands in each system to display the directory of a disk, initialize a disk, copy or compare files or an entire disk, erase files, configure the auxiliary serial port (usually for a modem or a letter-quality printer), type a file, set or display the time and date, and perform a preestablished batch file of instructions.

These commands—in both systems—are of two types. Some of them are executed by code that's embedded within the console com-



mand processor and that's always present in RAM; the others are stored in separate disk files and have to be called into memory whenever they're used.

In PC-DOS more of the common commands are resident than in CP/M-86, which results in generally quicker response times. Because of size constraints, however, this approach also results in commands that are less flexible and offer the user fewer options.

For example, the PC-DOS file copying function is simple-minded, with only a couple of elementary verify and concatenate options. In contrast, the CP/M-86 PIP (peripheral interchange program) copies and verifies files and also allows you to perform many other sophisticated operations on the data; it can start and stop the copying at selected text strings within the file, filter out form feeds or insert them according to page lengths that you specify, translate upper case to lower and vice versa, number output lines—and more.

With respect to utilities provided, the two operating systems differ even more sharply. Both have a line editor, but the CP/M-86 editor is vastly more powerful; the relevance of this difference, however, is questionable, since line editors are almost obsolete. They are a hangover from the barbaric days when the most common terminal device was a ten-character-per-second Teletype. It's a shame that on a well-defined machine like the IBM pc, neither Digital Research nor Microsoft saw fit to include a simple screen editor with their operating system.

CP/M-86 includes an on-line user assistance facility that virtually eliminates any need to refer to the operator's manual. When you can't remember how to use a certain command or utility program, you merely enter *help* and the function's name; the information you require will be displayed on the terminal.

Both CP/M-86 and PC-DOS provide a debugger that can be used to trace and modify the machine language of a program; the two debuggers are very similar, except that CP/M-86's has an interactive assembler capability that's a godsend to 8088 programmers.

PC-DOS also includes a linker, which is a general-purpose program that converts the output of assemblers and language compilers into a form that can be executed by the computer. The linker is of no use by itself, and it was apparently included on the DOS disk just so the documentation wouldn't have to be re-created in each of the other language manuals.

CP/M-86 doesn't give you a linker. Instead it offers a compact and efficient assembler named ASM86 that runs like lightning. This program is comparable to CP/M-80's ASM. It includes conditional assembly commands but doesn't handle true macro definitions or produce relocatable code. There is an awkward facility to define new instructions by the manipulation of bit fields, and this facility may be used as a simple macro processor. The assembler is pleasant to use and excellent for the creation of relatively small utility programs, but it's not adequate for big programming projects.

Last but not least, PC-DOS includes a Basic interpreter, a superset of the widely used MBasic language. The pc Basic has been greatly extended to include powerful graphics and sound capabilities. Unfortunately, Microsoft apparently got so caught up writing fancy graphics support software that they translated most code for the fundamental arithmetic operations directly from their 8080 Basic, without making any attempt to optimize it for the 8088. Consequently, benchmark programs run on a Z-80 and on the pc, both coded in Microsoft Basic, have shown that 8080/Z-80 Basic runs just as fast as the IBM version—even though the 8088 has faster memory access and includes hardware multiply/divide instructions.

Programming Languages. If you're using PC-DOS, you can write programs using Microsoft's Pascal or Fortran as well as their Basic interpreter or compiler. A macro assembler is available as a separate

package for $100, but it is so slow and bulky that it will probably die a natural death as soon as other software houses can provide a decent substitute. In addition, there are several C and Forth packages available from independent vendors.

Under CP/M-86, you'll be able to use Digital Research's two Basic compilers—CBasic-86 and CB-86—as well as Pascal/MT-86, Cis-Cobol, and PL/1-86. All these languages are either available now or scheduled for release in the near future. A full-fledged macro assembler that will generate relocatable code (to be called RMAC-86?) also is due for introduction in the next few months. Note that at present there is no Fortran implementation available, a definite handicap for scientific users.

DRI is also releasing a set of super program development tools called *Access Manager* and *Display Manager*. These will provide sophisticated, uniform file access and terminal display/data entry services for use with any of DRI's high-level languages. Since these compilers and support packages will eventually be implemented on all of Digital Research's target machines, a year or so from now you'll be able to write an application just once on your IBM pc and run it immediately on microcomputers built around the 8080, Z-80, 8086/88, 16000, or 68000.

As with PC-DOS, there are also several C and Forth systems from third parties that may be used with CP/M-86.

Technical Differences. Behind the slick pages of the operator manuals and behind the console interface seen by the casual user, PC-DOS and CP/M-86 diverge in important ways. Here are some of those differences.

PC-DOS doesn't provide the programmer with any easy way to control video text attributes (such as reverse video and blinking), clear the screen, or place the cursor at a specific position. To perform these operations the programmer must go around the operating system by making relatively complicated calls to the low-level drivers that are permanently fixed in the machine's read-only memory. CP/M-86 allows you to control the position and appearance of text on screen by mixing escape sequences right into your text stream; in this manner CP/M-86 treats the video display as though it were a standard smart CRT terminal.

Both operating systems have added new functions for use in application programs, in addition to implementing the basic set inherited from CP/M-80. PC-DOS provides facilities for programs to set or read the date and time, perform multiblock file I/O, and parse command lines. CP/M-86 went another direction altogether. Among other improvements, it incorporates about ten functions that let programs allocate memory dynamically on the basis of requirements determined at run time; these functions are reminiscent of such powerful minicomputer operating systems as DEC's RSX-11M.

The two operating systems have taken vastly different approaches to the allocation of disk space and the management of information about where files are stored. CP/M-86 distributes the information throughout the disk directory, so that the entry for each file name essentially describes where every block of information for that file is located. Under PC-DOS the directory entry only contains a pointer into a centralized table that represents the physical blocks in use on the entire disk.

The PC-DOS file allocation methods have some distinct advantages over those of CP/M-86. Sequential and random access to the contents of a file are both extremely fast. The date and time of the most recent modification to a file are stored right in the directory, along with the exact size of the file—to the nearest byte. You can also ask the operating system to read and write records of any size, in contrast to CP/M-86's requirement that file data always be supplied in 128-byte blocks.

The PC-DOS approach also has definite disadvantages. For example, it can result in inefficient use of disk space for certain applications. If you set up a random access file under both operating systems and write only a few scattered records, CP/M-86 will assign just enough disk space to hold the actual data, whereas PC-DOS will also allocate the empty records, whether they're ever used or not.

CP/M-86 takes a slow but safe approach to disk access: before writing any information into a file it compares the directory on the disk to a copy stored in memory and gives you an error message if there's a mismatch. PC-DOS works mainly from a copy of the directory stored in RAM. This method reduces the number of disk accesses required to open a file or write a record, but if you accidentally change disks before all files have been closed by your program, PC-DOS may make the new disk unusable by destroying its directory.

Much flack has been generated about the amount of work required to convert existing 8080/Z-80 programs to run under CP/M-86 or PC-DOS. Actually, the most frequently used operating system function calls are similar on both systems, and simply getting a program to run is a fairly straightforward process. Both Microsoft and Digital Research have automatic 8080 to 8086 assembly code translator programs that can speed the initial conversion. Optimizing these converted programs, however, so they exploit the full power of the 8088 instruction set is a great deal more complex and requires detailed analysis of register usage and program flow—a process that has little to do with the characteristics of either operating system.

Upward Mobility. When you outgrow your CP/M-86 system, your programs can be transported with little or no change to a larger system running Concurrent CP/M-86 or MP/M-86, which provide multitasking and multiuser capabilities, respectively. The PC-DOS user has, at present, no direct upward migration path. Microsoft's multiuser system under development is called Xenix and is a version of the Unix operating system, originally written in C for the PDP-11 line of minicomputers. PC-DOS is no more like Xenix than

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English is like Chinese, so programs will likely need drastic modifications before they can be moved from one system to the other.

Benchmarks. Microsoft has placed a lot of emphasis in its advertising and in trade-press articles on the fast program loading and file access of PC-DOS, compared to CP/M-86. It is a fact that in some circumstances the disparity in performance between the two systems is remarkable. A simple benchmark that ran a batch file to transfer three data files (twelve, twenty-five, and sixty-four kilobytes, respectively) from one disk to another and then list the directory took twenty-six seconds under PC-DOS and eighty-six under CP/M-86. Part of this difference is due to the fact that the copy and batch processor facilities are resident in PC-DOS and must be loaded from disk under CP/M-86; much of the difference, however, must be credited to the PC-DOS disk storage scheme.

Some other benchmark tests, reflecting more typical application conditions, produced the following results:

	PC-DOS	CP/M-86
Read a 10K file in sequential 128-byte blocks	**4.6 sec**	**3.5 sec**
Perform 100 random reads of 128-byte records in a 10K file (the same record number sequence was used on both systems)	**13.5 sec**	**32.0 sec**

CP/M-86's performance is superior on sequential file access with small records, because the operating system buffers an entire track of disk storage in RAM when possible, while PC-DOS excels in random access because of the centralized disk allocation table.

Summary. If you're planning to develop your own software, particularly if your application is demanding and sophisticated, you will probably prefer CP/M-86. The compilers provided by Digital Research generally are more powerful, run faster, generate more efficient machine code, and require less disk and RAM storage. The various DRI high-level languages, considered together with the new *Display Manager*, *Access Manager*, and graphics extensions as well as Concurrent CP/M-86 and MP/M-86, provide an array of classy support that will be hard for Microsoft to match.

For the more typical pc user who plans mainly to use packaged programs and do only casual programming, PC-DOS with its very versatile Basic and generally snappy performance will probably be the more appropriate. It certainly is the more economical, since it costs only $40 as opposed to $240 for CP/M-86. The head start PC-DOS received by virtue of being the only operating system available for many months ensured that, for the foreseeable future, the vast majority of commercial programs will appear for that operating system.

In the final analysis, both PC-DOS and CP/M-86 are solid, well designed, eminently usable products. The manuals for each are of phenomenally high quality compared to most microcomputer software documentation. Pressures of competition will probably make the two systems converge somewhat, as their creators add more and more functionality in the attempt to win increasing shares of a booming market. You really can't go wrong with either system, so perhaps the best advice is to select your application packages first on their own merits and then simply buy whichever system they require. ▲

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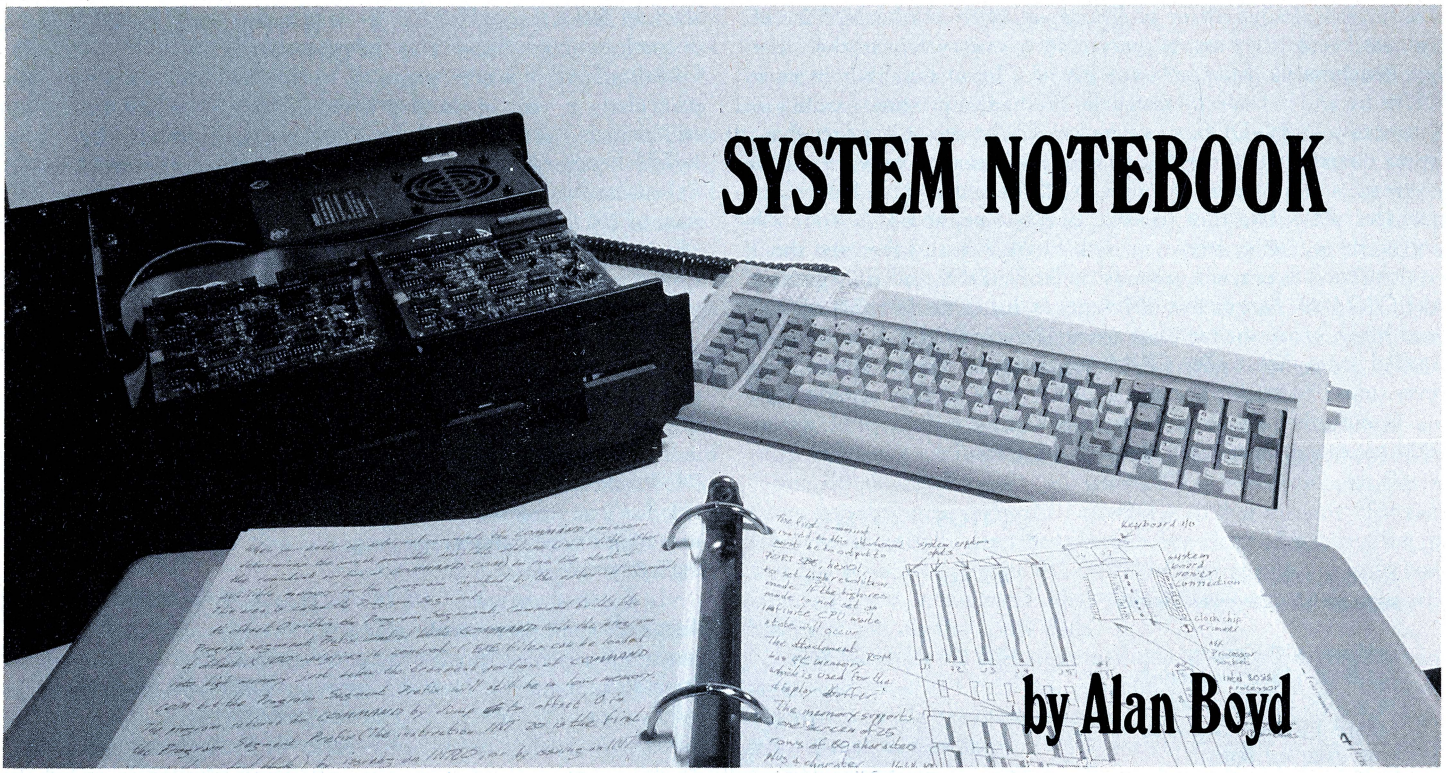

SYSTEM NOTEBOOK

by Alan Boyd

So far this column has covered all the DOS commands that are essential to effective use of the operating system. We've also touched on some commands, like *time, date,* and *sys*, that are perhaps less vital but still exceedingly useful.

Our subject this month falls into this latter category. DOS's batch facility is not so essential that you couldn't use the operating system without it. But if you take a few minutes to learn it, you'll find it can significantly reduce the amount of repetitive work you have to do in operating your computer.

Let's start by examining an operation that many of us encounter on a daily basis—the backing up of disks. What discrete steps does this operation require? Well, first we must format a blank disk, using the *format* command. Then we invoke either *copy* or *diskcopy*, depending on our requirements. Finally, we should run a verification of the copy disk by using the *comp* or *diskcomp* command.

In other words, we have to use at least three DOS commands to make the backup. Every day, if we back up that often, we have to enter the same string of commands, taking care to make sure each command is entered correctly. This is just the sort of rote task that a computer should be able to relieve us of.

DOS does, in fact, have the ability to remember a series of commands, and once it has remembered them the system can be made to execute such a series as though they were a single command. This capability is called *batching;* to exercise it you simply create a new command that is a batch of old ones.

The DOS manual describes batch as an internal DOS command. Batch is different from other internal—and external—DOS commands, however, in that it has no key word associated with it. You invoke a batch command not by entering the word *batch*, but by entering the name of a specially prepared batch file that you (or someone else) have stored on disk.

So even though the facility to perform batch functions is internal, in the sense that the code that performs the functions is stored in memory whenever DOS is booted, you can't do anything with batch unless you have a batch file on disk.

A batch file, which must be identified with the extension .bat, contains one or more DOS commands; these commands are stored in the file in exactly the same form they'd have if you entered them individually.

How To Bake a Batch File. So far we haven't discussed the manner in which files are actually created. We'll do this in a future article, and we'll go into some detail about the various ways to create files for use with DOS.

Those who have already bought a word processor, such as IBM's *EasyWriter* or Micropro's *WordStar*, may already be familiar with the creation of files. Some users may also be acquainted with *Edlin*, the line-oriented mini-editor supplied with DOS. Whatever method you are using to create files under DOS is perfectly acceptable for the purpose of this exercise. However, for those who haven't yet discovered this trick, here's a quick preview of a file-creating technique that will be discussed more fully in a future article.

Because of a feature of DOS called *device-independent I/O*, it's possible to treat the keyboard as though it were a file. This procedure may seem a little strange at first until its consequences become clear. Since the keyboard actually generates a stream of characters, there are many similarities between the results of its use and a disk file; a file, after all, is also a stream of characters.

A little creative thinking tells us then that if we can treat the keyboard (or *console*, as computer jargon has it when the keyboard is used in conjunction with the video screen) as a file, then we can use the *copy* command to create a backup of the keyboard's character stream. In DOS the keyboard and video screen are given the reserved name *Con:*, which stands for console. By copying this file, Con:, to a named disk file, we can trap all the characters typed at the keyboard and store them as a disk file.

The command to make such a disk file is:

COPY CON: filespec

where *filespec* is the complete file specification of the file in which we wish to store the character stream. For example, if we want to create a file that consists of a short letter to a friend and we want to store the file on the disk in drive B under the name Letter.fil, we enter the command:

COPY CON: B:LETTER.FIL

Anything we type at the keyboard will then be written out to disk and stored under that name.

When the letter is finished we need to enter a special character to tell DOS the file is complete, so we can return to the normal

DOS mode where commands are executed as they're entered. To do this we enter the standard character used by DOS to mark the end of a disk file. This character is a control-Z, achieved by hitting the Z key while holding down the key marked Ctrl. We actually don't have to do that much work, however. DOS conveniently turns the F6 key into the equivalent of a control-Z. Pressing F6 and hitting enter will terminate the *copy* command and return control of DOS to you. DOS will store the control-Z character on disk as a file terminator.

This *copy con: filespec* procedure is about the simplest method for creating DOS files. It is quick and convenient and doesn't require any software other than the internal commands of DOS. The problem with the method is that once you've pressed the enter key the line you've just entered is not available for editing. The editing features of DOS can only be used on what's called the *current* line, and once you hit enter a line is no longer current. Therefore, if you make a mistake and press enter, your file is essentially useless. For short files, however, such as the batch files we'll be discussing here, this method is perfectly acceptable.

Batch to Where We Left Off. So now we understand that batches of commands can be sent out to a file and stored on disk for submission to processing at some later time. Perhaps the best way to consolidate this information is to perform a simple example of batch file processing. For the purpose of this example, we'll assume you have a dual-drive system. Drive A will contain the DOS master disk or a copy thereof, and drive B will contain a freshly formatted disk with no files yet written on it.

Enter the following commands exactly as shown:

```
COPY CON: B:TESTFILE.BAT
DIR A:
DIR B:
COPY A:*.* B:
DIR B:
```

Then press the F6 key. This will cause DOS to enter a control-Z file terminator character into the file. It will display the character on screen as ^Z. Press the enter key and DOS will write the characters you have typed to the file Testfile.bat on drive B. As always, when DOS finishes executing a *copy* command, it will then display a message telling you how many files it has copied.

To verify that you have created a new file, issue the command *dir b:*. Then enter *type b:testfile.bat* and DOS will obligingly display the contents of your file.

Now you have series of simple DOS commands stored on drive B in a batch file named Testfile.bat. To invoke any batch file, you simply type the file's *filename*. So, to invoke the batch processing of the commands you've just stored, type the single command:

```
B:TESTFILE
```

and observe the results.

Predictably, DOS behaves as if the commands that make up Testfile.bat had been typed individually at the keyboard. When you type *testfile*, DOS displays the directory of drive A, then displays the directory of drive B. Then it copies all files from drive A to drive B. Finally, it displays the new contents of drive B. The net result is that you have created a new DOS command, *testfile*, whose function is to perform these separate steps. In the process you've reduced your typing burden so that nine keystrokes now do work that formerly required thirty-five.

And nine is an arbitrary number. Your newly created "meta-command" could have been given any appropriate name with a length of from one to eight characters.

The savings you've accomplished with *testfile* may not seem so terrific, but when long processes that are done on a frequent basis are automated through batch processing, considerable time and effort can be saved. As another aside, you may have noticed that it took the computer nearly four minutes to perform your simple batch operation. This is time that you can be using to perform more important and productive tasks, like getting a cup of coffee. Obviously, well planned batch files may relieve many operators of long stretches of rote computer work.

Going back to the example we discussed earlier—the formatting of new disks and the creation of backups—it's easy now to see that we can create a simple batch file that will perform this set of functions as though they were a single act. A batch file containing the commands

```
FORMAT B:
COPY *.* B:
```

will do exactly that. (Of course, if the batch file is on disk B, it will erase itself before it can complete the job!)

Format, however, is an interactive command. What this means is that because *format* is potentially destructive, it will not proceed without operator approval. The command first prompts you to insert a blank disk and press a key. When the formatting process is finished, DOS will ask if you want to format another disk. The responses to these queries cannot be stored in a batch file; you must be there at the keyboard to enter them when DOS inquires. The disallowance of responses to system prompts within batch files prevents you from creating a runaway batch that would destroy everything in sight. Fortunately, however, prompts issued by commands stored in batch files never require you to provide anything more than a confirmation that it's okay for the system to execute the next command.

This leads us to an interesting question. What happens if an operator enters the name of the wrong batch file and there are no interactive stages in the command? Can the batch process be stopped? Of course. There is a simple procedure by which any batch process can be terminated. You stop the process by holding down the control key and pressing scroll lock (break). DOS will display the prompt:

```
Terminate batch job (Y/N)?
```

and wait for a response. If you press Y, the batch process will end and the normal DOS system prompt will appear, returning control to you.

Autoexec.bat. Autoexec.bat is a reserved *filename* in the DOS world. Its function is different from that of any other batch file. When booted, DOS first performs several checks. One of these determines if there is a file on the disk by the name of Autoexec.bat. If there is such a file, DOS immediately transfers control to that file. Therefore the commands contained in such a file can be made to take over the operation of the computer as soon as DOS is booted.

Such a process is generally called creating a *turnkey* system (note the *n*). Turnkey systems are typically set up by computer experts for use by less sophisticated operators, or perhaps by an office manager for the use of her staff.

Many of the application software packages on the market use the Autoexec.bat facility simply because it removes the need for a user to learn a startup procedure for a piece of software; the startup is reduced to a simple set of instructions: insert disk, turn on computer. The Autoexec.bat file takes over and automates whatever steps would otherwise be required of the user.

An interesting byproduct of the use of Autoexec.bat is that it bypasses the normal

```
Enter today's date (m-d-y):
```

prompt when the system is booted. Of course any programmer designing an Autoexec.bat file can simply insert the *date* command into the file, forcing the operator to enter the current date (or press enter to decline).

This brings up an important point: if external DOS commands are used in a batch file, they must be available on the disk. Otherwise the batch process will return an error message stating that the command was not found. After issuing the error message DOS will forge ahead and read the next command in the batch file. The consequence of not having the correct file on the disk, or of having it misnamed, can be benign or harmful, depending on the circumstances.

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As an aside, here's an exercise in pure futility. Even though it doesn't actually do anything, it presents a unique opportunity to study the batch file process. Imagine, if you will, a batch file stored on disk under the name Autoexec.bat that contains the single command:

AUTOEXEC

When the system is booted with this disk, DOS will find that there is indeed a file named Autoexec.bat. Control will therefore be passed to that file. However, when the file is invoked, it simply sends out the command *autoexec*, which reinvokes the Autoexec.bat batch file, returning control to itself. The result is a loop; DOS will run around in circles.

Although this exercise performs no other useful function, it does demonstrate emphatically that batch files can be linked. That is to say, a batch file may contain a command that invokes another batch file. Such a command should be placed as the last item in the batch file, since control would be passed from the original file to the newly invoked one. Since batch files may be nested, DOS can actually be programmed in an unusually structured manner.

Rem. So that a user can return to a previously created batch file and understand its contents, DOS provides the *rem* command. This command has no function outside of batch files. It is used to pepper batch files with remarks, so they can be better understood when read at a later date. DOS will simply ignore any command that begins with the word *rem*.

Try typing a simple *rem* statement into the command line processor (at the A> prompt) and see what happens. DOS ignores the entry.

Pause. *Pause* is an internal command for use within batch files. When DOS encounters a *pause* command it halts the batch process and emits the message:

Strike a key when ready . . .

This command offers a convenient method of determining whether some operator action is necessary and of having the operator perform that action. For example, if for some reason a process controlled by a batch file becomes too large to fit on a single disk, a *pause* command may be inserted into the file, enabling the operator to remove one disk and replace it with another.

For the sake of clarity, DOS allows you to attach a comment to the *pause* command. DOS prints any such comments on screen along with the pause identifier. This is best demonstrated with an example.

Again, we assume for the moment that you're working with a dual-drive system. Create the following simple batch file, whose function is to print on screen the directories of two separate disks. First log onto drive A and use the

COPY CON: MYFILE.BAT

command to instruct DOS to save what you type at the console in a file named Myfile.bat on the disk in drive A. Then enter the following commands:

DIR B:
PAUSE Insert another disk in drive B
DIR B:

Follow this by pressing the F6 key to mark the end of the file. DOS will close the file Myfile.bat, capturing the commands you have just typed.

Make sure you have a disk in drive B. Invoke the newly created batch file by typing *myfile*, and watch the results. DOS will first display the directory of the disk in drive B. Then it will pause, after printing the message:

Pause Insert another disk in drive B
Strike a key when ready . . .

Do as it asks and press any key on the keyboard. The batch process will then continue by displaying the directory of the second disk.

One interesting way to use the *pause* feature is in conjunction with the abort sequence—as a step-by-step verification procedure. That is, by placing the statement:

Pause Press any key to proceed or control-break to terminate

after each statement in a batch file, you can give an operator the opportunity to terminate the process at any stage.

You may remember that many DOS processes can be halted by pressing control-C. Control-C is an almost universal termination signal in the world of computers. Just for consistency, the batch facility also recognizes control-C as a terminator; either control-C or control-break will halt the batch process and cause the terminate prompt to be displayed.

Beware. No, *beware* is not a DOS command, but you should take it literally when using DOS batch files that contain potentially destructive commands. The most obvious danger arises when you put *erase* commands inside a batch file. If the wrong disk happens to be in the drive, you may do some damage.

Another comical but surprisingly effective set of circumstances arises from having a batch file erase itself. Just for fun, try this one. Enter the following:

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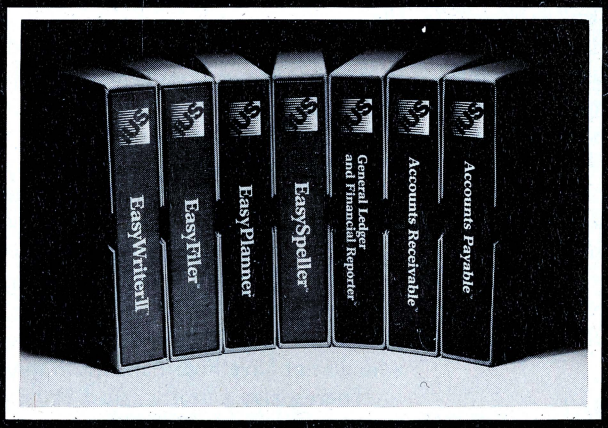

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```
COPY CON: MYFILE.BAT
DIR
ERASE MYFILE.BAT
DIR
^Z
```

Then invoke the file by typing *myfile*.

Not surprisingly, the batch file issues the *dir* command, to which DOS responds by displaying the directory of the disk. Next, the batch file erases itself. After it has finished doing so, it goes back to the disk to find itself so that it can retrieve the next command. When it doesn't find itself, it assumes that you've messed around with the disks while it was away. It therefore prompts you to

```
Insert disk with batch file
and strike any key when ready
```

not understanding the consequences of having already sent itself to the bit bucket.

Better Batching through Basic. To get a better idea of the doors opened by the batch capability, we ought to look at a more promising example, one that demonstrates more fully the power and function of the system. This one makes use of Basic, which is a program residing on the DOS master disk. Basic is stored in a file with the .com extension, so that it can be invoked simply by having its name typed into the command line interpreter.

Even though Basic is not generally thought of as a DOS command, the fact that it's stored in a file with the .com extension means that DOS treats it as one of its external commands. When Basic or BasicA is called from within a batch file, DOS gives it no special treatment. That means that whenever the user is finished with Basic and returns to DOS, DOS returns control to the batch file, just as though it had never left.

To illustrate, let's build a simple batch file that performs a DOS function, calls the Basic language, then performs another DOS function. You can do this by first making a backup copy of the DOS master disk and then creating a batch file with the following commands:

```
COPY CON: MYFILE.BAT
DIR
BASICA
DIR
^Z
```

When you invoke this batch file, it performs the *dir* command and then loads in Advanced Basic, leaving you in the hands of the Basic command line interpreter. If you know any of the Basic commands you should try them out at this point just to verify that you're in Basic.

If you don't know any of those commands, just type *files*, which is the Basic version of *dir*. When you're convinced, type *system*, the Basic command to return to the operating system. As soon as DOS takes control again it passes the process along to the exact point in the batch file where it left off. The final *dir* command is then performed.

Taking this idea a step farther, let's create a batch file that strings together Basic programs. Again using a backup copy of the DOS master disk, enter the following:

```
COPY CON: MYFILE.BAT
DIR
BASICA BALL
DIR
BASICA SAMPLES
DIR
^Z
```

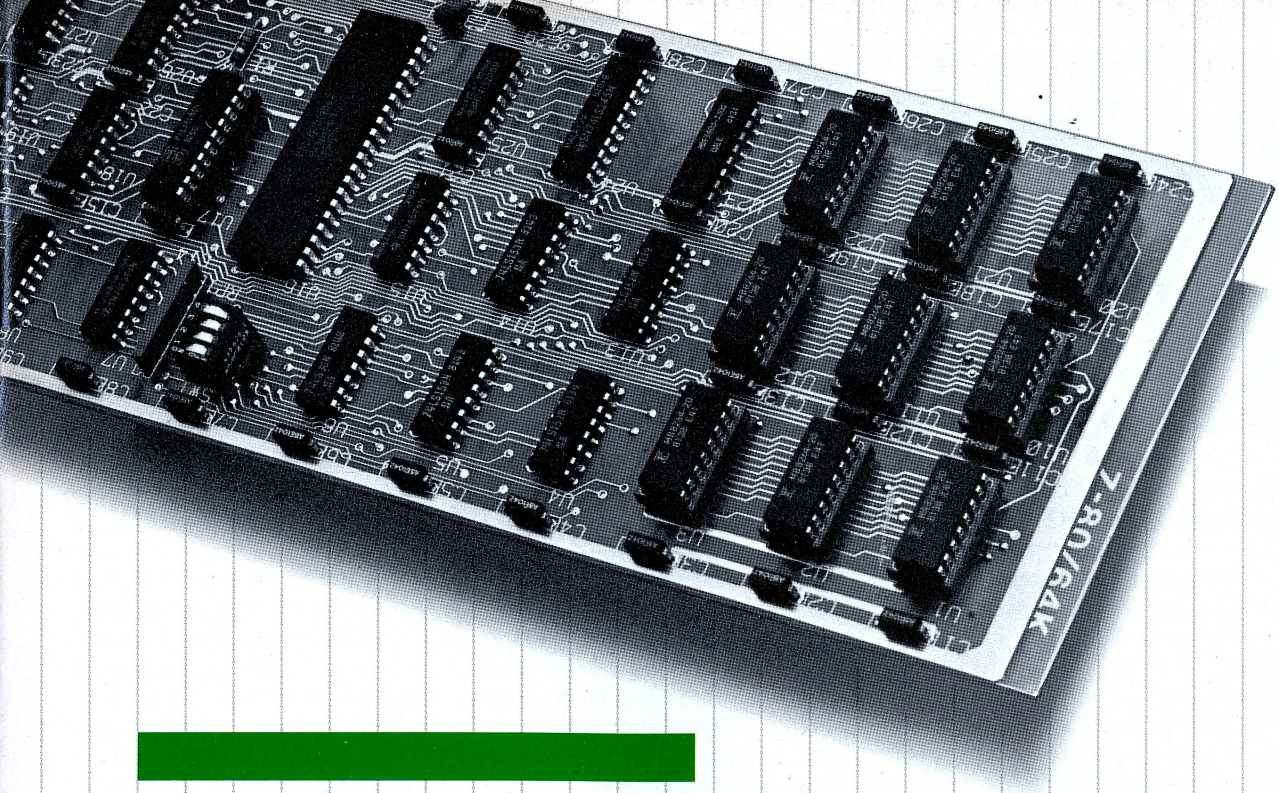
Then invoke the new batch command by typing *myfile* and digest the results. DOS first displays a directory of the disk. Then it loads BasicA and runs the program named *Ball*. Let this program run a few minutes and then press the escape key. When you're back at the Basic command line interpreter, enter the command *system*, to return to DOS.

DOS then obligingly displays another directory, just to demonstrate that the batch file has retaken control. Then DOS loads BasicA again and runs the program called *Samples*. This program actually passes control to other Basic programs, as you can demonstrate for yourself. When you are satisfied, press escape and return to the Basic command line interpreter. Enter *system* again to return to DOS, and watch DOS execute the last *dir* command from your batch file.

In many cases you'll find it worthwhile to examine the Autoexec.bat files supplied on commercial software. One interesting example of the elegance of the batch file capability is the use that *VisiCalc* puts it to. The *VisiCalc* disk contains an Autoexec batch file that contains the name of the *VisiCalc* program that operates in eighty-column mode. On the same disk, however, is another version of *VisiCalc* that operates in forty columns, for the benefit of those pc owners who do not have high-bandwidth monitors.

There's also a utility called *Vconfig*. The function of this utility is simply to create the Autoexec.bat file that will contain the appropriate startup procedure for the user's system. If you tell this utility you have a forty-column system, then it creates a batch file containing the command *vc40*. If you tell it you have an eighty-column system, it puts the *vc80* command into the Autoexec file. In this way, every time you boot the system with your *VisiCalc* disk the program comes up in the correct mode.

This then is a brief introduction to the batch capabilities of DOS. There's more, but it will have to wait until next month. ▲



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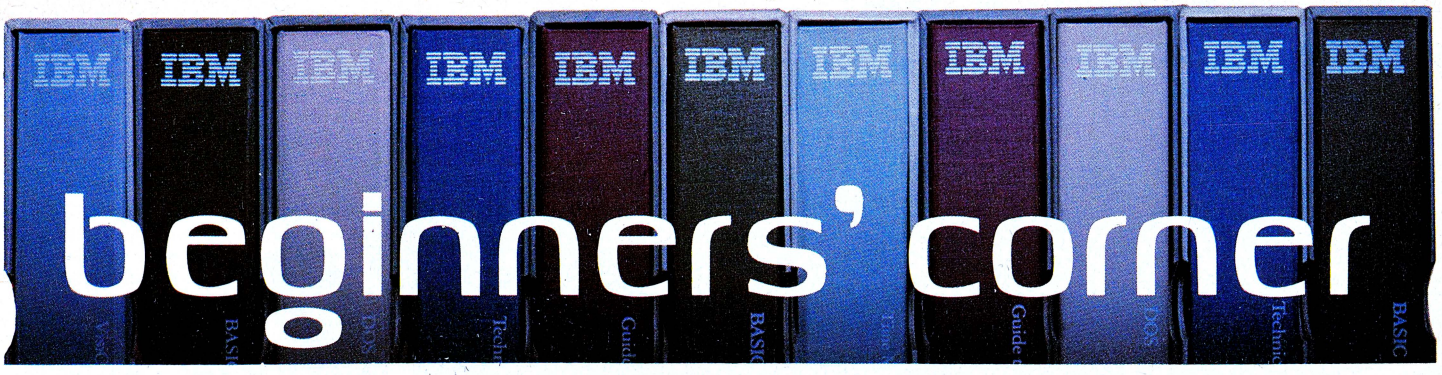

by Craig Stinson

Last month's column ended with a promise that this month's would delineate the various versions of Basic running on your Personal Computer and compare Basic to other programming languages. The promise was premature. We'd do well to look at some more rudimentary concepts first. With that in mind, here's a problem to ponder:

Suppose you want to find out if there's any merit to a certain strategy for playing blackjack. The books say your strategy is good but you've been taking a beating at the tables. Your problem is to find out whether your losses are due to short-term misfortune, bad advice, or both.

There are a couple of ways you might use your trusty computer to clarify the matter. One would be to do some thinking about the laws of probability and have your computer carry out the calculations. You'd find, however, that the probability issues are complex, especially if the strategy in question is one that takes into account the ways in which odds vary as cards are removed from the deck.

Since you already have a working hypothesis—a strategy you want to test—a more direct avenue toward the truth would be to have your computer run a simulation. Just teach the computer the rules of the game and the strategy you've been playing, then let it run off a few million hands and keep score. Short-term anomalies will cancel each other out over the long haul, so when the simulation is finished you'll either play your game with greater confidence or you'll know you need a new blackjack book.

This kind of problem is one for which computers are really well suited. They literally think nothing of repeating a set of operations a few hundred million times. As long as they're told clearly what to do and the juice is on and the hardware is functional, they're willing to do the same thing over and over indefinitely—quickly, reliably, and without demanding overtime pay.

The Computer as Time Machine. Furthermore, there are many kinds of questions to which simulations can provide more trustworthy answers than abstract reasoning. This is particularly the case when you're studying probability phenomena. Much of nature is too complicated to be anticipated in detail by abstract thinking. But with a computer you can build a model that approximately represents a piece of nature, then let the model play itself out on an accelerated time scale.

But how do you, proud pc owner, create the model you wish to test? How, for example, do you tell your computer to split aces and eights always but only split face cards and tens when the dealer has, say, a five or a six showing and tens constitute a large fraction of the deck remaining to be played?

You make up a very long list of rules. You put together the rules that define the game of blackjack itself, as you are going to have it played (those rules vary from one establishment to another, so you have to specify the exact playing conditions under which you want to test your strategy).

You also declare all the rules that constitute your strategy. This can be a simple step or an enormously complex one depending on how intricate your strategy is.

Furthermore, you provide rules that govern the execution of the simulation. Among other things, you have to tell the computer how to model a deck of cards, how to "shuffle" the cards in a manner that simulates random distribution, how to record the outcomes of each individual hand, and how many hands to play.

Algorithms. Then you tie all these rules together to form a single, composite set of instructions that the computer can follow. Such a set of instructions, in computer parlance, is called an *algorithm*.

Algorithm is a fancy word for procedure. You execute algorithms every time you make a phone call, drive a car, or tie your shoe. In the context of computers, however, the term implies a couple of things we don't always attach to the concept of procedure: an algorithm has to be unambiguous and it should be finite. You don't test blackjack strategy by having your computer play hunches; you have to give it enough instructions that it knows exactly what to do under any conditions that may arise. And, properly speaking, each algorithm you give the computer to execute should be finishable; if you set your computer to do something for which the only possible termination is a break in the electrical power or some disintegrating of the hardware, then you haven't given it an algorithm; you've put it in an infinite loop.

Perhaps by now you've spotted a paradox on the horizon. We want the computer to simulate an aspect of nature, which we assume to have at least some random, nondetermined components, and yet the computer has to have explicit rules governing its behavior under all circumstances it may face. To put this paradox in the context of our blackjack problem, we want to test our strategy on so many million random hands. How do we design an unambiguous algorithm that simulates random blackjack hands?

In truth, we don't; we can't. An algorithm that produces random results is a contradiction in terms. Certain ingenious people, however, have invented algorithms called random number generators (more properly pseudo-random number generators) that produce a series of numbers that have, to an acceptable degree, the statistical properties of randomness. These random number generating procedures take a certain starting value, called a seed, and perform complex arithmetical operations upon it to arrive at a second value; they then apply the same operations to the second value to get a third, and so on, and the result is a series of numbers that appears to be random.

Of course the same seed will always yield the same sequence of numbers. But it's possible for a computer to get a seed number from some nondetermined event in the world outside itself. For example, your pc could measure the number of millionths of a second that elapse between two keystrokes from its human operator and could derive a seed number from that value. This piece of information obtained from an event outside the computer would constitute a piece of *data* and would not, properly speaking, be considered part

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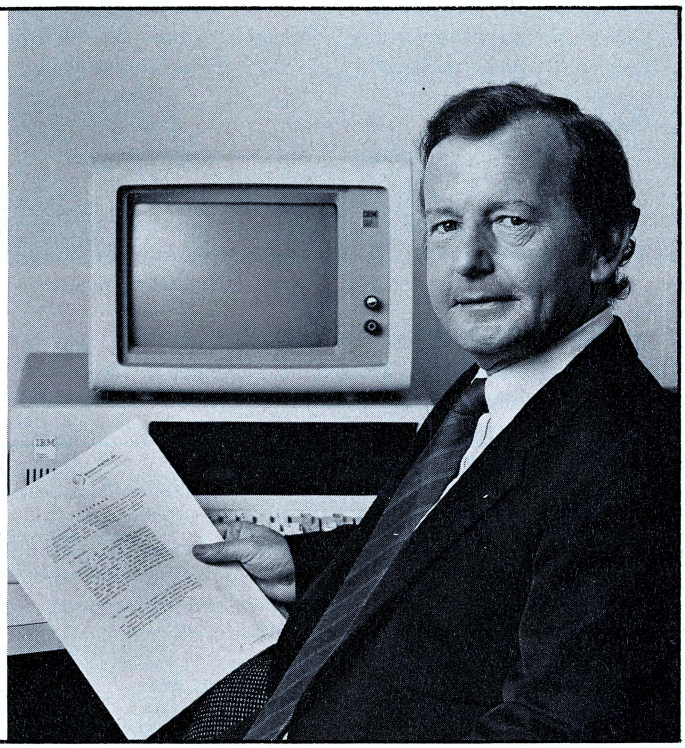

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of the algorithm.

Programs. Most nontrivial computer applications take in and process data supplied either by human operators or by events in the environment. The combination of an algorithm plus appropriate data, expressed in a form that can be understood and executed by a computer, is called a *program*, and the art of making such concoctions is known as programming. We'll have more to say about programming in a moment, but first a few more thoughts on algorithms.

Generally speaking, the conceptual process required to make a workable computer algorithm is to start with large procedures and refine them step by step into smaller and smaller subprocedures. We might, for example, outline our blackjack simulation superficially as follows:

1. Shuffle cards.
2. Deal hands.
3. Play hands.
4. Settle bets.
5. Record results.
6. Determine if desired number of hands have been played. If yes, report total results and quit; otherwise proceed to instruction 7.
7. Determine if enough cards remain to deal another round. If yes, return to instruction 2. Otherwise return to instruction 1.

Then we could take each of these seven steps and analyze it into smaller steps. Each smaller step could undoubtedly be broken down further, and so on until we reached a level that allowed no more refinement.

If this looks like an arduous way to spend an evening, you've got it right. An algorithm to do a nontrivial computer application is seldom simple. Looking in on a problem from the outside, from the coarsest level of refinement, it's also seldom obvious which is the best way to proceed.

One of the reasons the design of computer algorithms is difficult is that as human beings we tend to think in terms of results rather than process. In other words, few of us while executing the drink-a-cup-of-coffee algorithm think of discrete steps like "extend hand to cup,""grasp handle,""retract arm and hand with cup enclasped," and so on. We just drink.

Computers, on the other hand, have to have their instructions digested into the most minute, primitive steps. For example, at many points in our blackjack simulation we would want the computer to add two values and compare their sum to a third number (we'd want it, for example, to check each player's first two cards to see if they totaled twenty-one). The actual, executable instructions required to make that happen might look something like this:

1. Get a number from a specified memory address and store it in a specified processor register.
2. Get a number from another memory address and store it in another register.
3. Add the number in the first register to the number in the second and store the result in a specified register.
4. Compare the number in the last named register to the value stored in a specified address and jump to a specified instruction sequence if the values are equal; if they're not equal, proceed to the next instruction.

Your IBM Personal Computer has a repertoire of a couple hundred elementary operations, all of which are about as primitive as the ones just described. Any task you give your computer ultimately must be expressed to it by means of this fundamental instruction set.

Down to Basics. Fortunately for programmers, it isn't necessary to refine every algorithm into such primitive terms. There are tools available that take commonly used procedures and disinte-

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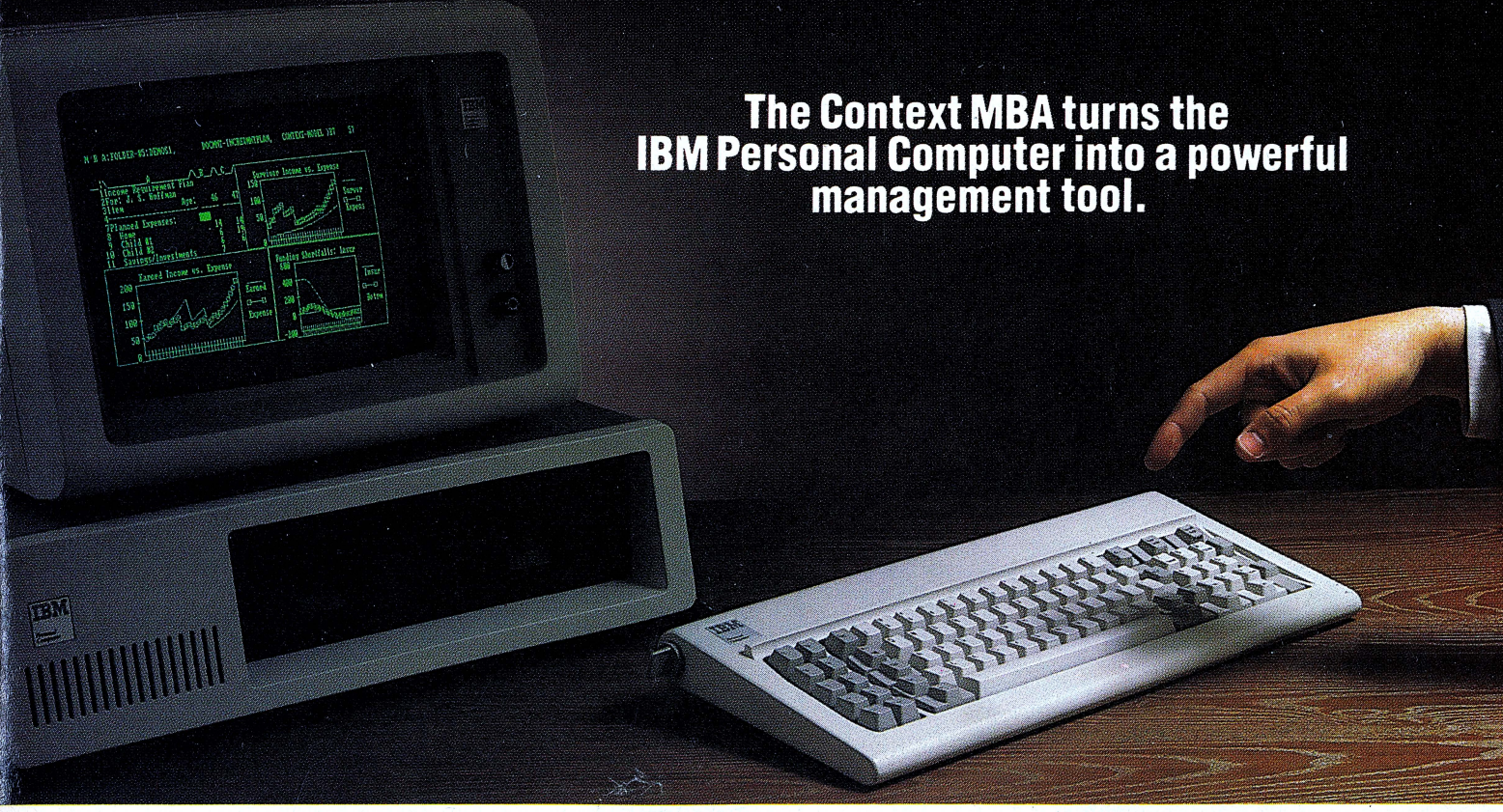

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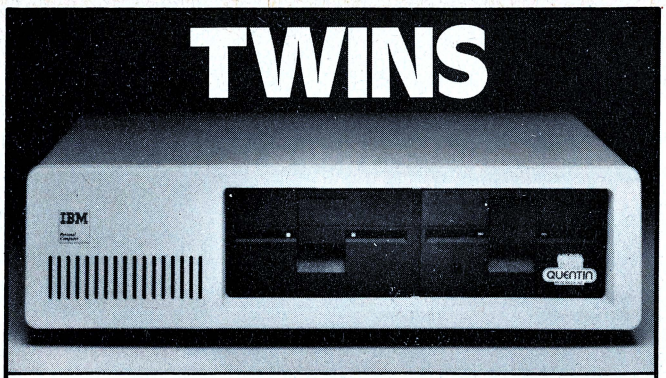

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grate them into their machine-level components. These tools fall under the general heading of programming languages.

Returning once more to our gambling paradigm, the routine that checks two cards to see if they make a blackjack could be expressed in the programming language Basic in a form like this:

```
100  IF CARD1 + CARD2 = 21 THEN GOTO 200 ELSE
     GOTO 400
```

which is a whole lot easier to write (and to read) than the individual machine-level instructions we summarized a moment ago.

Programming languages accomplish a number of related things. First, they allow the programmer to think in terms of larger procedural constructs, so that a desired result can be achieved with fewer instructions. Second, they permit the formulation of instructions in terms that are more like the way we think. The vocabulary of most programming languages is derived from natural language (the kind we speak); Basic, for example, looks like a kind of stilted English.

Third, programming languages facilitate the maintenance of programs. Programmers seldom get things right the first time. Even when they do, the needs they address with their programs usually change over time, so most useful programs need to be modified once in a while. Often the modification takes place long after the original program was written. If the programmer had to go back and look at machine-level code every time a piece of software needed repair, the software industry would lag even farther behind the hardware industry than it does now.

Fourth, they lend what you might call contextual flexibility to procedural constructs. An analogy will help here.

Everybody knows that English words can have vastly different meanings depending on their context. The ambiguity of our language is a pain in the neck for anyone wanting to learn it, but it really does serve some useful purposes. Quite apart from the opportunities it provides to poets and punsters, the variability of meaning that words have allows us to express a much larger set of ideas with a given set of resources. As it is, the range of human thought and feeling far exceeds the capacity of language, but if our words couldn't serve multiple duty we'd probably never have anything interesting to say.

For the same kind of reasons, although on a much cruder scale, the vocabulary of a programming language must also do multiple duty. Looking back at an earlier example, it's easy to figure out that the *if...then...else* construct in Basic causes the computer to perform a test of some kind and modify its subsequent behavior according to the outcome. But exactly what kind of test will depend on what lies between *if* and *then*.

If card1 + card2 = 21 then... will cause the computer to get two values from memory, add them, and compare the sum to a third number. *If card1 = card2 then...* would result in a different kind of test, and so on. Even a relatively straightforward Basic command like *print*, which causes the computer to display something on the video screen, translates to different machine-level instructions, depending on what it is you want to print, how you want to print it (flashing or not, colored or not), and where you want to print it.

Yet another function of programming languages is to make software less machine-specific. A program written in Basic for the IBM Personal Computer will need some modification if you want to run it on an Apple. But it won't need nearly the amount of modification that an equivalent piece of machine-level code would require.

Last and by no means least, programming languages make it feasible for a person who's not a computer specialist and has no intention of becoming one to write his or her own computer applications. With tools like Basic, Pascal, and Logo at your disposal, you can test your blackjack strategies to your heart's content, without having to rely on anyone else's integrity (how do you know that programmer isn't working for the casinos?) and without anyone else being the wiser. ▲

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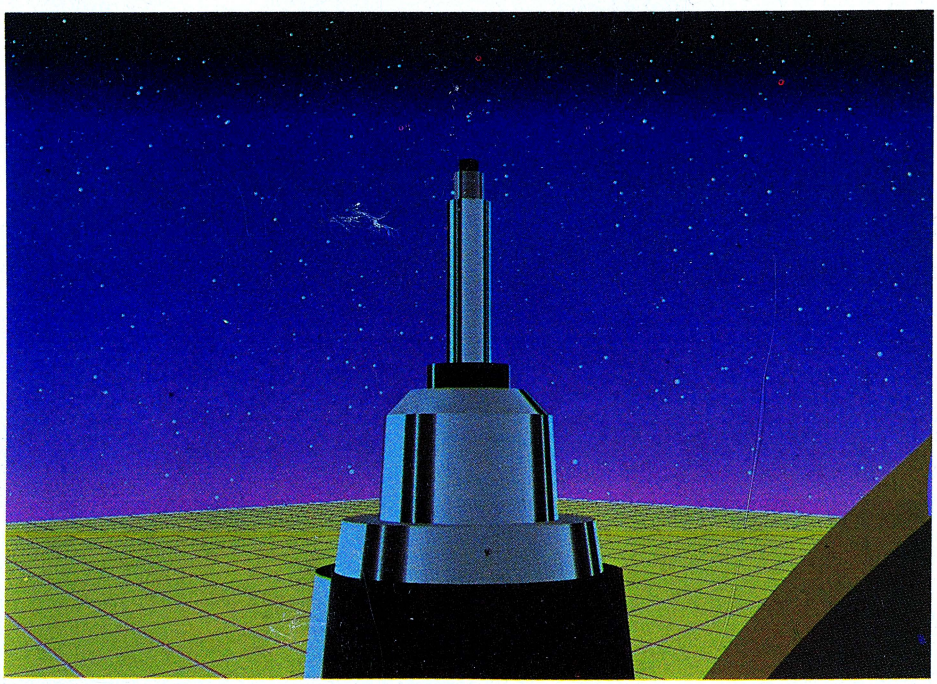
Δ What Hath Tron Wrought? You are floating in outer space. Far in the distance is a triangular plane covered with some kind of gridwork. Then you are moving toward it at an incredible speed and the black, airless void turns bright blue as you make contact with its atmosphere. You perceive objects floating above the surface. They appear to be pillars and concave triangular solids which, as you approach within inches, can be seen to contain . . . Pentel pens.

Δ The Big Check-Out. Taking books out of a public library is one of the last great free things in America—anyone can do it if their library credit's good. Nevertheless, many people have missed the spirit of the idea and are neglecting to return what they have borrowed.



That's the scenario of the first television commercial produced by Cineflex Pictures of Los Angeles, and it claims to be the first thirty-second spot consisting entirely of computer-generated imagery. Cineflex, the commercial film division of Pacific Electric, achieves its effects with 256 color selections, sixteen density types, and a nearly infinite number of available shapes—the same kind of solid geometry system used in the film *Tron*.

Producer Gary Rocklen and his "imagists" feed object descriptions into a computer, which then makes the digital-to-analog translation of the image to 35 millimeter film. The result is "pure" computer-simulated graphics, with no opticals or combinatory imagery. The specific system and process are tightly held trade secrets in this suddenly competitive field.

Cineflex's next commercial was for Twentieth Century-Fox video games, an assignment that required filling the screen with a close-up of a tiny lo-res video game figure. Cineflex created a graphics program that simulates the play of one of the Fox/Atari games. With 2,100 lines of resolution available in their filming system, the only problem, as Rocklen recalls, was not to misrepresent the product as looking better than it really does.

Collecting fines and retrieving overdue or stolen books is a serious business. Library investigators in Los Angeles try to collect on more than one million dollars' worth of fines and materials each year. Failure to return books or pay fines can result in six months in jail or a $500 fine.

The downtown Los Angeles Central Library will soon be going on-line with CRTs hooked up to IBM mainframes at the City Hall Data Service Bureau, giving them access to patrons' overdue book files. Several branch libraries already have this system successfully in operation.

The L.A. Public Library system has been a leader in in-house library automation, according to Elizabeth Higbie, who oversees

the system from the central library. "We've been handling acquisition of books, inventory, and the making up of book cards on the IBM for several years."

With the new patron file terminals, if someone owes money, their library card is confiscated on the spot. This cuts down on repeat offenders and gives the library a front line to protect their books and audio-visual materials.

"The IBM terminal system is becoming a very valuable tool at more branches each year," says Higbie.

"Before this sytem, we had no way of dealing with it at all, except for looking up records on microfiche, which was very cumbersome."

The major stumbling block to equipping a library with electronics effectively has been the sheer size of the task. According to Higbie, "It's been very difficult to find a system to handle a public library as large as this one. It takes so much equipment. Whenever money is available, we start looking at new ways to automate."

Right now they are watching what the Chicago Public Library is doing with a newly installed Data Phase system with one hundred terminals. "We don't want to have to start from scratch again," says Higbie. "It's just too expensive." So they watch and wait patiently for expansion money to be budgeted their way. Meanwhile, the war against pilferage of books and audio-visual materials goes on.

Library offenders are offbeat thieves. They often stick to stealing only books on their favorite subjects. One man cleaned out all the Elvis records in several branches only hours after the star had died.

Although most people pay their fines when notified to do so by mail, the worst offenders hold out until they have to be hunted down. One man owes $2,200 in books and fines to eight San Fernando Valley branches. Several hundred borrowers owe more than a thousand dollars each.

Δ **Prisoners Pass Plato.** In Stillwater, Minnesota, at the State Penitentiary, they offer an escape from the dead end of serving time—computerized rehabilitation. Their slogan might be: "Go to prison—earn a bachelor degree in computer programming." Stillwater inmates have the option to learn basic and advanced computer skills through an educational alternative program called Insight, Inc.

The program was originally the dream of a Stillwater inmate, John P. Morgan, when he was in solitary confinement ten years ago. "I wanted to fill a void in prison education," says Morgan. "We had classes—some vocational training and the G.E.D. test (equivalent to a high school diploma)—but there were no secondary courses offered. I wanted to create something for those who had the desire and mental equipment for college-level work."

Insight provides a challenging opportunity and is unquestionably popular. Nine inmates are presently enrolled. The curriculum includes 650 hours of instruction, equivalent to twenty-three lower-division credits at the University of Minnesota. The truly ambitious can earn bachelor and associate of arts degrees as computer technicians, systems analysts, or engineers.

The hardware for the Insight program is supplied by Control Data Corporation, based in Minneapolis. Much of the prisoners' curriculum emulates the courses offered by the Control Data Institutes across the country. Three of Control Data's Plato terminal systems link the inmates' classroom in Cellblock D via modem to the company's Supercomputer 176, located in a suburb of Saint Paul.

"Unique in the history of penology," says Morgan, "Insight is privately funded and inmate-run." There are seventeen classes available, and a 3.0 grade point average or better has been maintained. Insight has earned eighteen men bachelor degrees and has seen twenty-five men through their junior and senior years before they were paroled. Thirty-five men have obtained certificates of completion in computer programming and operations. Since 1975, there

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Written in machine language and BASICA, MICROCOSM requires PC-DOS, 64K and one disk drive; no other accessories are needed. The game can be played on 40 or 80 character, monochrome or color, with countless special display options.

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have been a total of 140 participants in the program.

Once trained in programming, an inmate is eligible to teach others through a contract with Control Data in a job preparation project called Homework. As instructors, they teach homebound and disabled students the basics of programming and computer operations.

Control Data is involved in prison reform at Stillwater even beyond the Insight program and Homework project.

According to Pat McKinnie, senior public relations consultant, Control Data also employs fifty-one inmates at the prison in assembling components for Control Data computers. To be accepted for the program, McKinnie says, "Applicants go through one of our programs called Fair Break that instructs them in basic spelling, math, and grammar skills using the Plato terminals. They also learn job-seeking and job-retention skills that can be used in and out of prison."

Δ Prognosis for Arcadia. If you're an arcade video-game addict, you stand a 65 percent chance of developing arthritic conditions in your hands and wrists.

That's the bad news from Dr. Gary E. Myerson, a video-game addict and head of the three-man rheumatology team that conducted a study of 142 Atlanta video-game patrons. The good news is that preliminary findings suggest that better design of video games, not mere abstinence following injury, could do a lot to prevent potentially serious conditions from developing.

The standard arcade game is ideally suited to persons of statistically average height—namely, five feet, eight inches tall, says Myerson. People above and below that average show a marked tendency to develop temporary arthritic problems. These include neuralgic pain in the fingers, wrists, palms, and arms; tendonitis, causing local inflammation and redness; and finally, blisters and callouses.

In addition, standard playing consoles—sporting dials, buttons, and joysticks that must be pushed, punched, and twisted—tend to be improperly angled, putting additional strain on wrists and finger joints. Adjustable arcade seats, friction-free plastics for playing surfaces, and the use of playing gloves may be partial solutions. But only partial, Myerson adds, because the principal cause of injury is rapid repetition of one of four actions—pressing buttons, manipulating joysticks, rotating spheres, and twisting dials.

"Any of those motions performed at a rapid rate and at frequent intervals will be pain-provoking and joint-injuring," says Myerson, whose study evaluated fifteen popular arcade games. (Home computer games will be investigated in a subsequent

study.) Thirteen of the arcade games required two-handed play, and all required at least two kinds of playing motion.

Myerson says no particular arcade game studied proved particularly problem-producing, but the investigation raised additional questions that he and his research team plan to explore in greater detail. On the drawing board, he says, is a more ambitious project calling for a long-term study of an entire high school class. Its focus will be twofold: to assess long-range benefits, such as improved hand-eye coordination; and to evaluate long-term susceptibilities of different kinds of players to chronic disorders, such as numbness or tingling sensations.

The study represents the first statistical approach to the subject according to the Atlanta rheumatologist. "This study disproves the notion that the problem is anecdotal. It's for real. Sixty-five percent of the people who play arcade games develop a problem."

The problems tend to go away within twenty-four hours if a player uses common sense and rests the sore or inflamed joint, says Myerson, but he recommends abstaining forty-eight hours to be on the safe side.

As for the researcher's sympathies, they are definitely those of a confirmed videogame addict. "Playing a game is a great way to release tension and go into what I call reversible mindlessness," says Myerson. "Once you start playing you're back to normal."

Δ **Two-Wheel Sensation.** Bicyclists in the California seaside community of Huntington Beach have good reason to believe the town is paving their way with good intentions. The city, boasting one hundred miles of bike lanes, is upgrading its Honeywell K-HMP 190 minicomputer traffic signal system to give pedal pushers a little vehicular respect.

A key new element, says traffic engineer Ralph Leyva, is improved amplification of road sensors that monitor bike lanes as well as auto traffic. Heavy activity in a sensored bike lane will activate the computerized signal, giving cyclists approximately twelve seconds to break away.

In the past, cyclists had to dismount, hit a not-so-responsive "pedestrian button," and then wait for the thirty-second crossing signal. The new system, the first of its kind in Orange County, is designed primarily to increase traffic flow.

The improved amplifiers, in operation now for three months, were installed at a cost of $1,200 per intersection. Plans call for upgrading eleven more crossings this year.

Δ **Knocking Off Chips.** After designing and scrapping half a dozen versions of its 64K RAM chip, Intel introduced the finished product this year, months after Motorola and Texas Instruments put their respective versions on the market.

Intel's patience and expertise were rewarded early in September when International Business Machines contracted with the Santa Clara Valley firm for the design and process information of the component. IBM may use the technology to produce chips in the form of Intel's second-generation design, the 2164A, replacing IBM's own lower first-generation 64K component.

Intel has previously provided IBM with 16K chips and a microprocessor chip for the IBM Personal Computer.

Δ **North of the Border.** The Canadian government is studying the social impact of new office technologies and seeking means to help workers adjust to electronic office systems. To that end, the *Electronic File Cabinet*, a software product by Officesmiths Inc. of Ottawa, Canada, allowing access to and retrieval of office documents and information on various microcomputers, will be field tested by the Canadian Ministry of Energy Mines and Resources.

Almost three quarters of a million dollars will be allocated over a period of two years to field test the software in the administrative branch of the finance and administration sector of EMR. The money will be spent under the Office Communications Systems program, established in 1980 to help Canadian companies develop the industrial capacity to supply the growing national and international markets for integrated electronic office products and services. The OCS program is a joint initiative of the Department of Industry, Trade, and Commerce, headed by Herb Gray, and the Department of Communications, ministered by Francis Fox.

The trial, to be conducted in three phases, will involve system design and definition of standards conforming to the needs of its users, implementation of a pilot automated system for administrative manuals, and introduction of an integrated system of administrative support information for use in regional offices across the country. Studies will also be undertaken on user satisfaction and administrative productivity, and a report entitled "What Happens To Your Office When Your Administrative Support System Is Automated" will be issued.

The trial will be implemented in consultation with affected workers, who will assist in the design of the system and development of training and education programs on a voluntary basis.

"In particular," said the rather traditional communications minister Fox, "it is important that the OCS program examine the implications of new office systems as they affect employment opportunities for women as women remain concentrated in occupations that will be greatly affected by the electronic office." ▲

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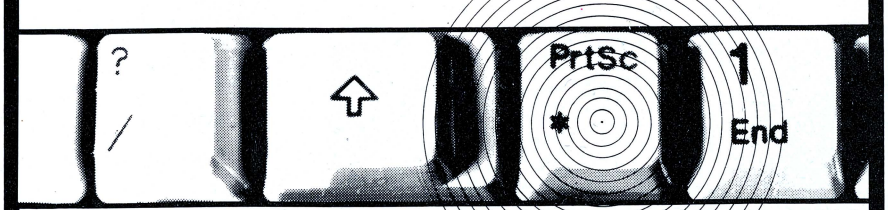

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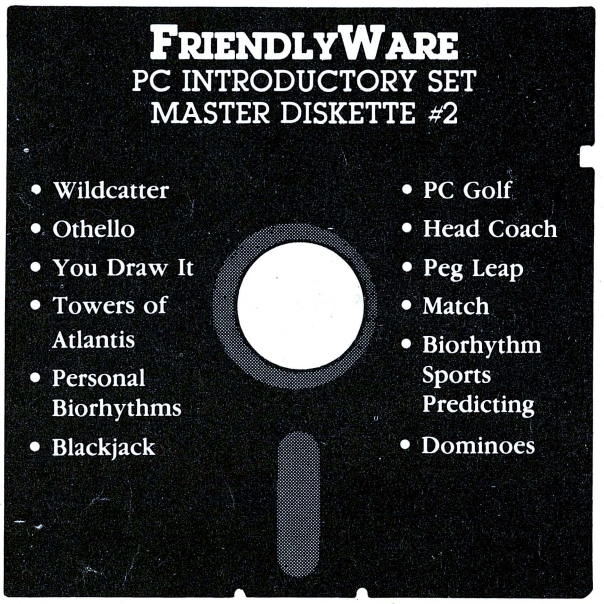

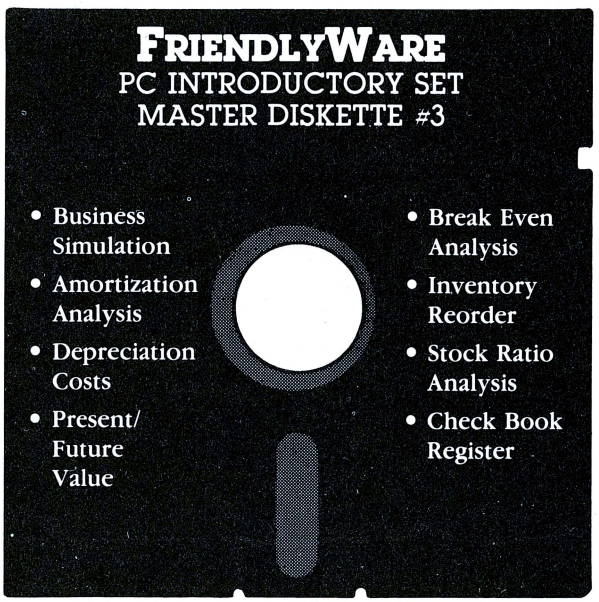

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softalk presents the bestsellers

The battle between the two software giants in microcomputerdom took a twist in the IBM pc market in the month of August when *WordStar* edged out *VisiCalc* as the bestselling program.

The pc marketplace is the first mass market in which the two programs have gone head-to-head. *WordStar* has long been the bestselling CP/M software, while *VisiCalc* has been the bestselling program overall, with much of its sales coming from non-CP/M markets such as Apple and Hewlett-Packard. *WordStar* and *VisiCalc* are sold side-by-side for other machines, but those markets do not provide true tests of the relative appeal of the programs. Some markets are too small and some, like Apple, are not comparable. In the Apple market, CP/M is an expensive add-on required before *WordStar* can be used, while *VisiCalc* works on standard Apple DOS.

That makes the IBM market, where both are being sold in volume on the same operating system, the first true measure of relative marketplace appeal between the two giants. *VisiCalc*, because it's been available from day one, has sold many more units than relative newcomer *WordStar*, but August results indicate that *WordStar* is beginning to close that gap.

Of course, any analysis of sales of the two programs must take into account both the general appeal of their particular applications and the specific competitive environment within that application. Electronic spreadsheets are slightly better sellers in the pc marketplace than are word processors; the difference is that *WordStar*'s competition lags behind, while *VisiCalc* is beginning to be hard-pressed.

In July *WordStar* had a six to one lead over *EasyWriter II* and an eight to one lead over *EasyWriter 1.1*. Those margins have narrowed to five to one and seven to one, but *WordStar* clearly stands alone in the minds of pc owners as the word processor of choice. Even the recent stronger showing by fourth choice *Volkswriter* has made little dent in *WordStar*'s domination.

On the other hand, *VisiCalc* is facing *SuperCalc*, a program that seems to be gaining momentum each month. *VC*'s July margin of five to two over *SC* dipped to three to two in August. Coupled with a stronger showing by *MBA*, a product more comprehensive than either *Calc* product, that market segment is getting highly competitive.

The imminent arrival of *Multiplan* from Microsoft should heat up the electronic spreadsheet market further, but that does not necessarily imply smooth sailing for *WordStar* at the top. Several software publishers are readying word processors for the pc market, which should add to the competitive aspects there as well.

This poll also brought to light the fact that some Computerland stores are now voluntarily implementing practices that they had previously carped about being forced into in the Apple market.

Almost to a man, Computerland dealers welcomed the pc because they wouldn't have to participate in the discounting and sales inducements necessary to compete in the competitively supercharged Apple market. But some of them apparently couldn't stand prosperity.

FriendlyWare sent out a demo of its *PC Introductory Set* approximately a month before it was actually ready to ship product. In accordance with the implications of their name, FriendlyWare sent out the demo without copy protection. Some dealers took advantage of that practice to make copies for customers as an inducement to buy systems.

Everybody loses in such a situation. All dealers lose in that they may all soon be forced to cut margins, even in a market where shortage of product is the salient reality. FriendlyWare clearly lost potential business. Even the recipients of the "free" software will lose

We think our new mailing list program is the best in the world. And we're not alone.

1st CLASS MAIL. By Bob Schoenburg and Steve Pollack. Here's a pair of authors who may be software's answer to Irving Wallace. Wallace is the bestselling author who hears the murmuring of general populace and caters to their desires. Bob Schoenburg and Steve Pollack seem to have the same trait.

Consider.

The pair brought out *Home Money Minder*, a perfectly respectable home finance package. Then they listened to the user feedback. The result was *Home Accountant*, one of the phenomenal success stories of the first half of 1982.

Around the same time *Home Money Minder* hit, the team also tested the market with *The Mailroom*. Mailroom never was the success of *HMM*, but the authors used the same technique – listen to the users and incorporate all the good ideas. The result is **1st CLASS MAIL** – a program that, incredibly enough, manages to live up to its double-entendre name.

All of the above is not to accuse Schoenburg and Pollack of putting out the programming equivalent of stalking-horses to do their market research for them. Their original efforts do stand on their own merit. They just pale next to the sequels.

1st CLASS MAIL is so well thought out and so easy to use that other publishers who call their programs "user friendly" should bow their heads in shame.

SOFTALK got an early release of the program sans documentation. Yet a rank computer illiterate was able to apply the program to two separate uses with relatively little trouble. This is high praise indeed: that a novice operator could use a powerful program with no more than the screen menus.

The program allows for twelve fields, clearly more than the traditional name and address of a mailing label. The implication is that the software can be put to other innovative uses as well. The built-in ability to sort and filter on any field or combination thereof enhances the chances that users will find multiple applications for the program.

Continental Software will actually be publishing four versions of the program.* The one already in release is for the Apple II using floppy disks. A hard-disk version will follow. Both versions are pending for Apple III as well, awaiting the development of a rapid binary sort subroutine.

1st CLASS MAIL is a first-rate program for specialized data base applications.

Reviewed by Al Tommervik, Publisher, Softalk.

***Available for: Apple II,™ Apple III™/III with Profile,™ IBM-PC™/IBM-PC with Tecmar™ hard disk/IBM-PC with Davong™ hard disk.**

Continental Software

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in the long run, because FriendlyWare spokesmen indicate they will adopt the not-so-friendly practice of copy-protecting their software.

FriendlyWare's response is totally understandable. What's not so easily understood is why dealers who professed pleasure at IBM's hold-the-line-on-prices policy would introduce marketing anomalies themselves. What's clear is that, if the IBM market degenerates into the same kind of chaotic pricing found in some areas in the Apple market, the dealers will have nobody but their own kind to blame. Mike Scott and Mike Markkula, past and present presidents of Apple, were the scapegoats in the Apple market, but dealers will only have to look around the room at the next Computerland franchisee convention to see the IBM culprits.

Generally the August market suffered from the same sluggishness felt in other areas of the economy as a whole and the microcomputer economy specifically. The paucity of widely distributed product still provides for an open market readily accessible to good new product. In August, *Personal Finance Program* from Best Programs, *Olympic Decathlon* from Microsoft, and *Floppy Frenzy* from Windmill entered the Top Thirty in their first month of distribution.

Communications remained high on pc owners' lists of add-on capabilities. The *Asynchronous Communications Support* package jumped to fifth, *Crosstalk* rose to seventeenth, and *Data Capture* gained two spots to twenty-eighth.

Which program is number one—*WordStar* or *VisiCalc*—is still to be decided; and it looks like it'll be pc owners who put out the definitive word. ▲

IBM Personal Computer sales outlets representing approximately 6.6 percent of all sales of pc and pc-related products volunteered to participate in the poll.

Respondents were contacted early in September to ascertain their sales for the month of August.

The only criterion for inclusion on the list was the number of units sold—such other criteria as quality of product, profitability to the computer store, and personal preference of the individual respondents were not considered.

Respondents in September represented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only for the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 4.3 percent, which translates roughly into the theoretical possibility of a change of 4.82 points, plus or minus, in any index number.

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1.	2.	165.95	**WordStar;** MicroPro
2.	1.	152.97	**VisiCalc,** Software Arts/Dan Bricklin and Robert Frankston; VisiCorp, IBM
3.	3.	98.34	**SuperCalc;** Sorcim
4.	4.	62.14	**PC Introductory Set,** FriendlySoft
5.	15.	61.46	**Asynchronous Communications Support;** IBM
6.	11.	58.73	**Home Accountant Plus,** Mike Farmer, Bob Schoenburg, Larry Grodin, and Steve Pollack; Continental Software
7.	9.	37.56	**Zork I;** Infocom
8.	20.	36.19	**Zork II;** Infocom
9.	7.	32.80	**EasyWriter II,** Basic Software Group; Information Unlimited Software
10.	25.	32.10	**Basic Compiler,** Microsoft; IBM
	13.	32.10	**Microsoft Adventure,** Gordon Letwin (Will Crowther and Don Woods); IBM (Microsoft)
	8.	32.10	**IBM Pascal,** Microsoft; IBM
13.	6.	30.73	**General Accounting,** John Moss and Ken Debower; BPI
14.	14.	30.05	**MailMerge,** MicroPro
15.	12.	29.37	**Macro Assembler,** Microsoft; IBM
16.	4.	28.68	**General Ledger;** IBM (Peachtree Software)
17.	29.	26.63	**Crosstalk;** Microstuf
18.	16.	25.95	**EasyWriter 1.1,** John Draper; IBM (Information Unlimited Software)
19.	10.	25.27	**Deadline;** Infocom
	21.	25.27	**Fortran Compiler,** Microsoft; IBM
21.	23.	24.58	**MBA;** Context Management Systems
22.	17.	22.54	**Temple of Apshai,** Jeff Johnson, John Freeman, and J. W. Connelly; Epyx/Automated Simulations
	—	22.54	**Floppy Frenzy;** Windmill Software
24.	—	21.85	**Olympic Decathlon,** Tim Smith; Microsoft
25.	30.	21.17	**Volkswriter,** Camilo Wilson; Lifetree Software
26.	21.	20.49	**Total Information Management;** Innovative Software
27.	—	17.76	**Personal Finance Program,** Kenneth Petersen; Best Programs
28.	30.	16.39	**Data Capture,** David Hughes and George McClelland; Southeastern Software
29.	19.	15.02	**Typing Tutor,** Michael Sierchio (Dick Ainsworth and Al Baker); IBM (Microsoft)
	30.	15.02	**Las Vegas Blackjack,** Charles Montante; Quala

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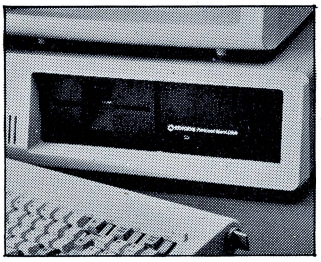

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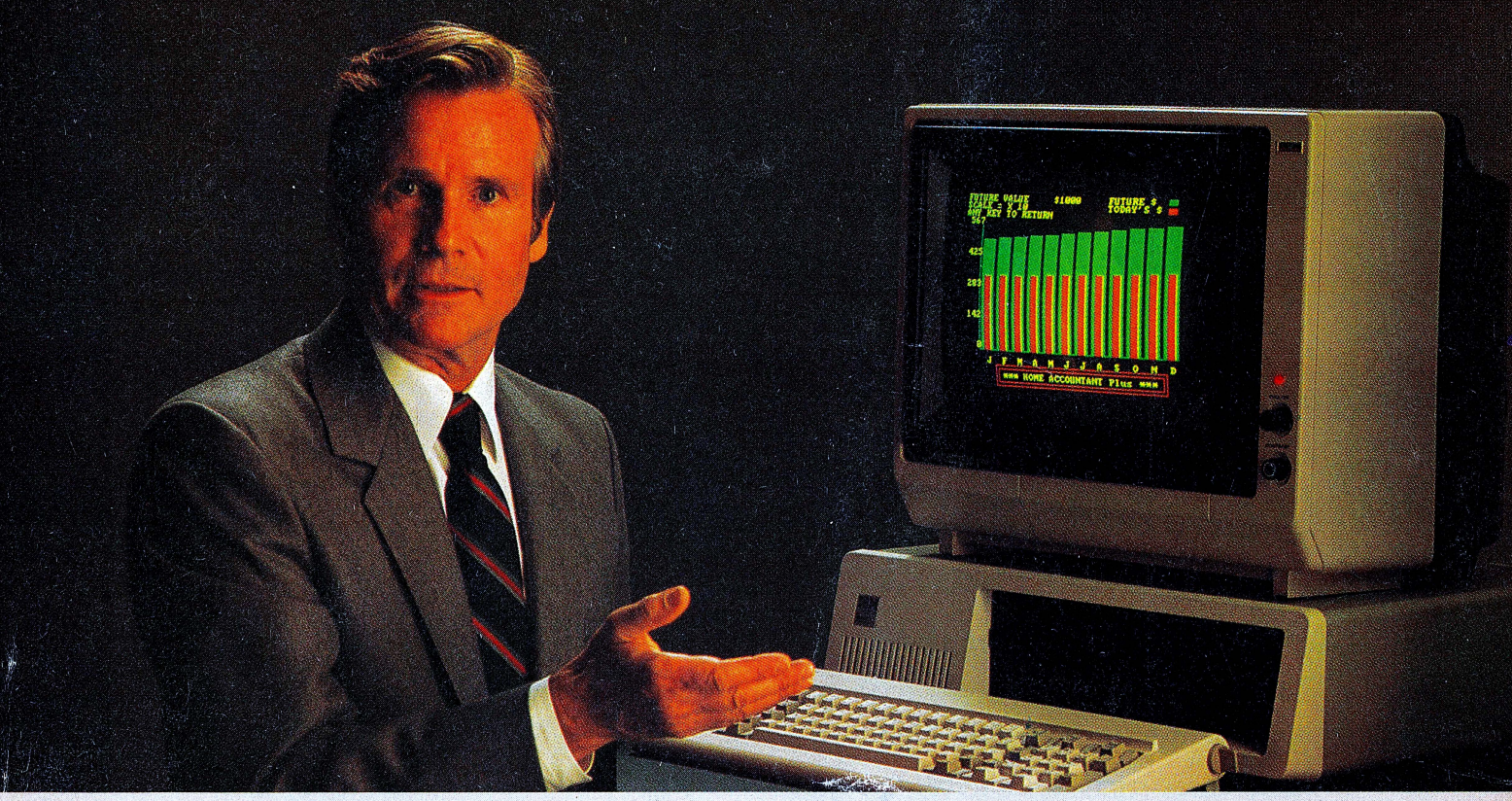

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